GE Medical Systems

Technical Publication

Direction 2286865

REVISION 5

GE Medical Systems
LOGIQ™ 7 Service Manual

Important Precautions

Language

- THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.
- IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.

WARNING

- DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.
- FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.

- CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.
- SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.

AVERTISSEMENT

- NE PAS TENTER D'INTERVENTION SUR LES éQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS éTé CONSULTé ET COMPRIS.
- LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAîNER CHEZ LE TECHNICIEN, L'OPéRATEUR OU LE PATIENT DES BLESSURES DUES à DES DANGERS éLECTRIQUES, MéCANIQUES OU AUTRES.

- DIESES KUNDENDIENST-HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.
- FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENöTIGT, IST ES AUFGABE DES KUNDEN FüR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.

WARNUNG

- VERSUCHEN SIE NICHT, DAS GERäT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST-HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLäGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

AVISO

- **ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.**
- **SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.**
- **NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**
- **LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.**

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONíVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A' CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVVERTENZA

- **IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.**
- **SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.**
- **SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

このサービスマニュアルには英語版しかありません。
ＧＥＭＳ以外でサービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。

警告

このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないで下さい。
この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

本维修手册仅存有英文本。
非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。

注意:

未详细阅读和完全了解本手册之前，不得进行维修。
忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent write “Damage In Shipment” on ALL copies of the freight or express bill BEFORE delivery is accepted or “signed for” by a GE representative or hospital receiving agent. Whether noted or concealed, damage MUST be reported to the carrier immediately upon discovery, or in any event, within 14 days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this 14 day period.

Call Traffic and Transportation, Milwaukee, WI (262) 827-3468 or 8*285-3468 immediately after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section “S” of the Policy And Procedures Bulletins.

CERTIFIED ELECTRICAL CONTRACTOR STATEMENT

All electrical Installations that are preliminary to positioning of the equipment at the site prepared for the equipment shall be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, calibrations and testing shall be performed by qualified GE Medical Systems personnel. In performing all electrical work on these products, GE will use its own specially trained field engineers. All of GE’s electrical work on these products will comply with the requirements of the applicable electrical codes.

The purchaser of GE equipment shall only utilize qualified personnel (i.e., GE’s field engineers, personnel of third-party service companies with equivalent training, or licensed electricians) to perform electrical servicing on the equipment.

OMISSIONS & ERRORS

If there are any omissions, errors or suggestions for improving this documentation, please contact the GE Medical Systems Global Documentation Group with specific information listing the system type, manual title, part number, revision number, page number and suggestion details. E-mail the information to : **UltrasoundDocError@med.ge.com**

GE Medical Systems employees should use the Customer Quality Assurance (CQA) System to report all documentation omissions, errors or suggestions.

Revision History

Revision	Date	Reason for change
0	September 1, 2001	Initial Release
1	November 20, 2001	Revision 1
2	February 22, 2002	Electrical Requirements (sec2), STCW and TXCW theory, Monitor video specification (sec5), TRAP2 Dip SW, QCON Dip SW, LV2 unit released,Trackball cleaning (sec 6), New diagnostics (sec 7), New LFC procedure added (sec8), New part number (sec9)
3	November 11, 2002	Probe precaution (sec1), Optional peripherals (sec3), Dongles (sec5), Trackball cleaning, Jumper and Dip switch setting (sec6), Diagnostics (sec7), PC box replacement, software loading for R2 (sec8), New part number (sec9),
4	April 2, 2003	Monitor and LCD Adjustment, DDBF and Trap settings (sec6), Keyboard FRU replacement (sec8), Renewal Parts (sec9)
5	September 22, 2003	Added: New Printer and probe (Sec. 3), HDD Jumper setting (sec 6), R3 software (sec 8), New spare parts (Sec. 9)

List of Effected Pages

PAGES	REVISION	PAGES	REVISION	PAGES	REVISION
Title Page	5	1-1 to 1-15	5	Back Cover	N/A
Warnings i to iv	5	2-1 to 2-11	5		
Rev Hist/LOEP v to vi	5	3-1 to 3-21	5		
Table of Contents vii to xv	5	4-1 to 4-16	5		
		5-1 to 5-21	5		
		6-1 to 6-18	5		
		7-1	5		
		8-1 to 8-40	5		
		9-1 to 9-24	5		
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Chapter 1
Introduction

Section 1-1
Overview

1-1-1 Purpose of Chapter 1

This Chapter describes important issues related to safety servicing this ultrasound machine. The service provider must read and understand all the information presented here before installing or servicing a unit.

1-1-2 Chapter Contents

Table 1-1 Contents in Chapter 1

1-1-3 Purpose of Service Manual

This manual provides service information on the LOGIQ™ 7 Ultrasound Scanning System. It contains the following chapters:

1.) **Chapter 1, Introduction:** Contains a content summary and warnings.
2.) **Chapter 2, Pre-Installation:** Contains any pre-installation requirements for the LOGIQ™ 7.
3.) **Chapter 3, Installation:** Contains the LOGIQ™ 7 installation procedure with installation checklist.
4.) **Chapter 4, Functional Checks:** Contains functional checks that must be performed as part of the installation, or as required during servicing and periodic maintenance.
5.) **Chapter 5 Theory**: Contains block diagrams and functional explanations of the LOGIQ™ 7 electronics.
6.) **Chapter 6, Service Adjustments:** Contains instructions on how to make any available adjustments to the LOGIQ™ 7.
7.) **Chapter 7, Diagnostics/Trouble Shooting:** Provides procedures for running and diagnostic or related routines for the LOGIQ™ 7.
8.) **Chapter 8, Replacement Procedures:** Provides disassembly procedures and reassembly procedures for all changeable FRU.
9.) **Chapter 9, Renewal Parts:** Contains a complete list of replacement parts for the LOGIQ™ 7.
10.) **Chapter 10, Periodic Maintenance:** Provides periodic maintenance procedures for the LOGIQ™ 7.

1-1-4 Typical Users of the Basic Service Manual

- Service Personnel (installation, maintenance, etc.).
- Hospital's Service Personnel
- Architects (Some parts of Chapter 2 - Pre-Installation)

1-1-5 LOGIQ™ 7 Models Covered by this Manual

Table 1-2 LOGIQ™ 7 Model Designations

Part Number	Description
2287317	LOGIQ™ 7 100V / NTSC Console and Peripherals
2304806	LOGIQ™ 7 120V / NTSC Console and Peripherals
2304807	LOGIQ™ 7 220V / PAL Console and Peripherals
2304808	LOGIQ™ 7 220V / NTSC Console and Peripherals
2354857	LOGIQ™ 7 100V / NTSC Console and Peripherals (Style B/Ver2)
2354858	LOGIQ™ 7 120V / NTSC Console and Peripherals (Style B/Ver2)
2354859	LOGIQ™ 7 220V / PAL Console and Peripherals (Style B/Ver2)
2354860	LOGIQ™ 7 220V / NTSC Console and Peripherals (Style B/Ver2)
2355589	LOGIQ™ 7 100V / NTSC Console and Peripherals (Style B/Ver2)

1-1-6 Purpose of Operator Manual(s)

The Operator Manual(s) should be fully read and understood before operating the LOGIQ™ 7 and also kept near the unit for quick reference.

Section 1-2
Important Conventions

1-2-1 Conventions Used in Book

Model Designations.

This manual covers the LOGIQ™ 7scanners.

Icons.

Pictures, or icons, are used wherever they will reinforce the printed message. The icons, labels and conventions used on the product and in the service information are described in this chapter.

Safety Precaution Messages.

Various levels of safety precaution messages may be found on the equipment and in the service information. The different levels of concern are identified by a flag word that precedes the precautionary message. Known or potential hazards are labeled in one of three ways:

DANGER **DANGER IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT WILL CAUSE SEVERE PERSONAL INJURY OR DEATH IF THE INSTRUCTIONS ARE IGNORED.**

WARNING ***WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD THAT CAN CAUSE SEVERE PERSONAL INJURY OR PROPERTY DAMAGE IF INSTRUCTIONS ARE IGNORED.***

CAUTION **Caution is used to indicate the presence of a hazard that will or can cause minor personal injury and property damage if instructions are ignored.**

NOTICE *Equipment Damage Possible*
Notice is used when a hazard is present that can cause property damage but has absolutely no personal injury risk.
Example: Disk Drive will crash.

NOTE: Notes are used to provide important information about an item or a procedure. Be sure to read the notes; the information contained in a note can often save you time or effort.

1-2-2 Standard Hazard Icons

Important Information will always be preceded by the exclamation point contained within a triangle, as seen throughout this chapter. In addition to text, several different graphical icons (symbols) may be used to make you aware of specific types of hazards that could possibly cause harm.

Some others make you aware of specific procedures that should be followed.

Table 1-3 Standard Hazard Icons

ELECTRICAL	MECHANICAL	RADIATION
		
LASER	**HEAT**	**PINCH**
		

Some others make you aware of specific procedures that should be followed.

Table 1-4 Standard Icons that indicates that a special procedure is to be used

AVOID STATIC ELECTRICITY	TAG AND LOCK OUT	WEAR EYE PROTECTION
		

1-2-3 Product Icons

The following table describes the purpose and location of safety labels and other important information provided on the equipment.

Table 1-5 Warnings

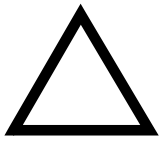
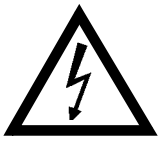
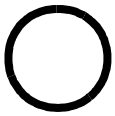
Label/Symbol	Purpose/Meaning	Location
Identification and Rating Plate	Manufacturer's name and address Date of manufacture Model and serial numbers Electrical ratings	Rear of console near power inlet
Type/Class Label	Used to indicate the degree of safety or protection.	
IP Code (IPX68)	Indicates the degree of protection provided by the enclosure per IEC60 529. IPX68 indicates can be used in operating room environment.	Footswitch
	Equipment Type BF (man in the box symbol) IEC 878-02-03 indicates B Type equipment having a floating applied part.	Probe connectors and PCG connector
	Equipment Type CF (heart in the box symbol) IEC 878-02-05 indicates equipment having a floating applied part having a degree of protection suitable for direct cardiac contact.	ECG connector and Probes marked Type CF
Device Listing/Certification Labels	Laboratory logo or labels denoting conformance with industry safety standards such as UL or IEC.	Rear of console
CAUTION - This unit weighs...Special care must be used to avoid..."	This precaution is intended to prevent injury that may result if one person attempt to move the unit considerable distances or on an incline due to the weight of the unit.	On the console where easily seen during transport
"DANGER - Risk of explosion used in..."	The system is not designed for use with flammable anesthetic gases.	Rear of console
	"CAUTION" The equilateral triangle is usually used in combination with other symbols to advise or warn the user.	Various
	ATTENTION - Consult accompanying documents is intended to alert the user to refer to the operator manual or other instructions when complete information cannot be provided on the label.	Various

Table 1-5 Warnings

Label/Symbol	Purpose/Meaning	Location
	"CAUTION - Dangerous voltage" (the lightning flash with arrowhead in equilateral triangle) is used to indicate electric shock hazards.	Various
	"Mains OFF" Indicates the power off position of the mains power switch.	Rear of system adjacent to mains switch
	"Mains ON" indicates the power on position of the mains power switch.	Rear of system adjustment to mains switch
	"ON" indicates the power on position of the power switch. CAUTION This Power Switch DOES NOT ISOLATE Mains Supply "Standby" indicates the power stand by position of the power switch. CAUTION This Power Switch DOES NOT ISOLATE Mains Supply	Adjacent to On/Standby Switch
	"Protective Earth" Indicates the protective earth (grounding) terminal.	Various
	"Equipotentiality" Indicates the terminal to be used for connecting equipotential conductors when interconnecting (grounding) with other equipment.	Rear of console

Section 1-3
Safety Considerations

1-3-1 Introduction

The following safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual, violates safety standards of design, manufacture and intended use of the equipment.

1-3-2 Human Safety

Operating personnel must not remove the system covers.

Servicing should be performed by authorized personnel only.

Only personnel who have participated in a LOGIQ™ 7Training Seminar are authorized to service the equipment.

1-3-3 Mechanical Safety

WARNING ***WHEN THE UNIT IS RAISED FOR A REPAIR OR MOVED ALONG ANY INCLINE, USE EXTREME CAUTION SINCE IT MAY BECAUSE UNSTABLE AND TIP OVER.***

WARNING ***ULTRASOUND PROBES ARE HIGHLY SENSITIVE MEDICAL INSTRUMENTS THAT CAN EASILY BE DAMAGED BY IMPROPER HANDLING. USE CARE WHEN HANDLING AND PROTECT FROM DAMAGE WHEN NOT IN USE. DO NOT USE A DAMAGED OR DEFECTIVE PROBE. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS INJURY AND EQUIPMENT DAMAGE.***

WARNING ***NEVER USE A PROBE THAT HAS FALLEN TO THE FLOOR. EVEN IF IT LOOKS OK, IT MAY BE DAMAGED.***

CAUTION **Always lock the Control Console in its parking (locked) position before moving the scanner around.**

CAUTION **Disconnect all probes before moving the scanner around.**

CAUTION **The LOGIQ™ 7 weights 225 kg or more, depending on installed peripherals, (496 lbs, or more) when ready for use. Care must be used when moving it or replacing its parts. Failure to follow the precautions listed below could result in injury, uncontrolled motion and costly damage.**

ALWAYS:

- **Be sure the path way is clear.**
- **Use slow, careful motions.**
- **Use two people when moving on inclines or lifting more than 23 kg (50 lb).**

NOTE: Special Care should be taken when transporting the unit in a vehicle:

- Secure the unit in an upright position.
- Lock the wheels (brake).
- DO NOT use the Control Panel as an anchor point.
- Place the probes in the carrying case.
- Eject any Magnet Optical disk from the MO Drive (if installed).

1-3-4 Electrical Safety

To minimize shock hazard, the equipment chassis must be connected to an electrical ground. The system is equipped with a three-conductor AC power cable. This must be plugged into an approved electrical outlet with safety ground. If an extension cord is used with the system, make sure that the total current rating of the system does not exceed the extension cord rating.

The power outlet used for this equipment should not be shared with other types of equipment.

Both the system power cable and the power connector meet international electrical standards.

1-3-5 Label Locations

NOTE: For the symbols shown in the illustration below, refer to previous pages in this chapter.

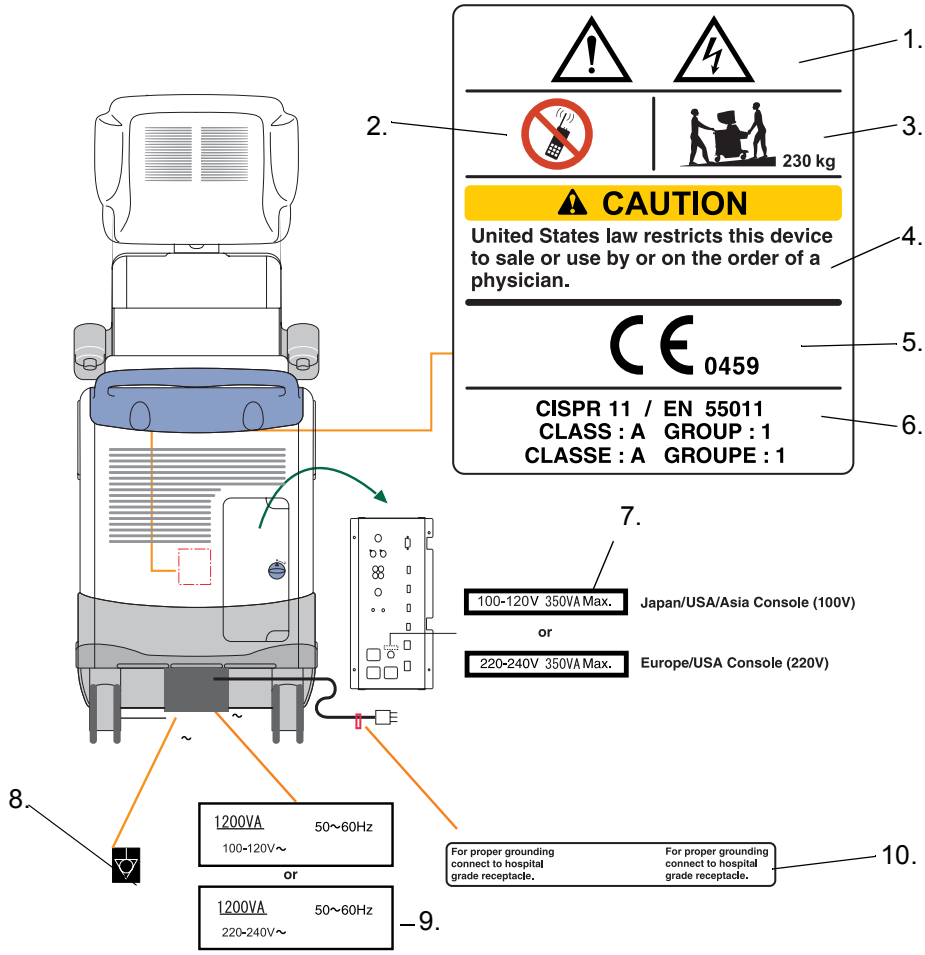


Figure 1-1 OUTSIDE MARKINGS OF LOGIQ™ 7 (Back Side)

1.) Possible Shock Hazard
2.) Caution for devices near by the equipment
3.) Caution for Transportation
4.) Prescription Devices (For USA Only)
5.) CE Marking of conformity
6.) CISPR
7.) Voltage Range
8.) Signal Ground Point Label
9.) Power Indication Label
10.) Caution for Grounding Reliability (For USA, Canada and Japan)

1-3-5 Label Locations (cont'd)

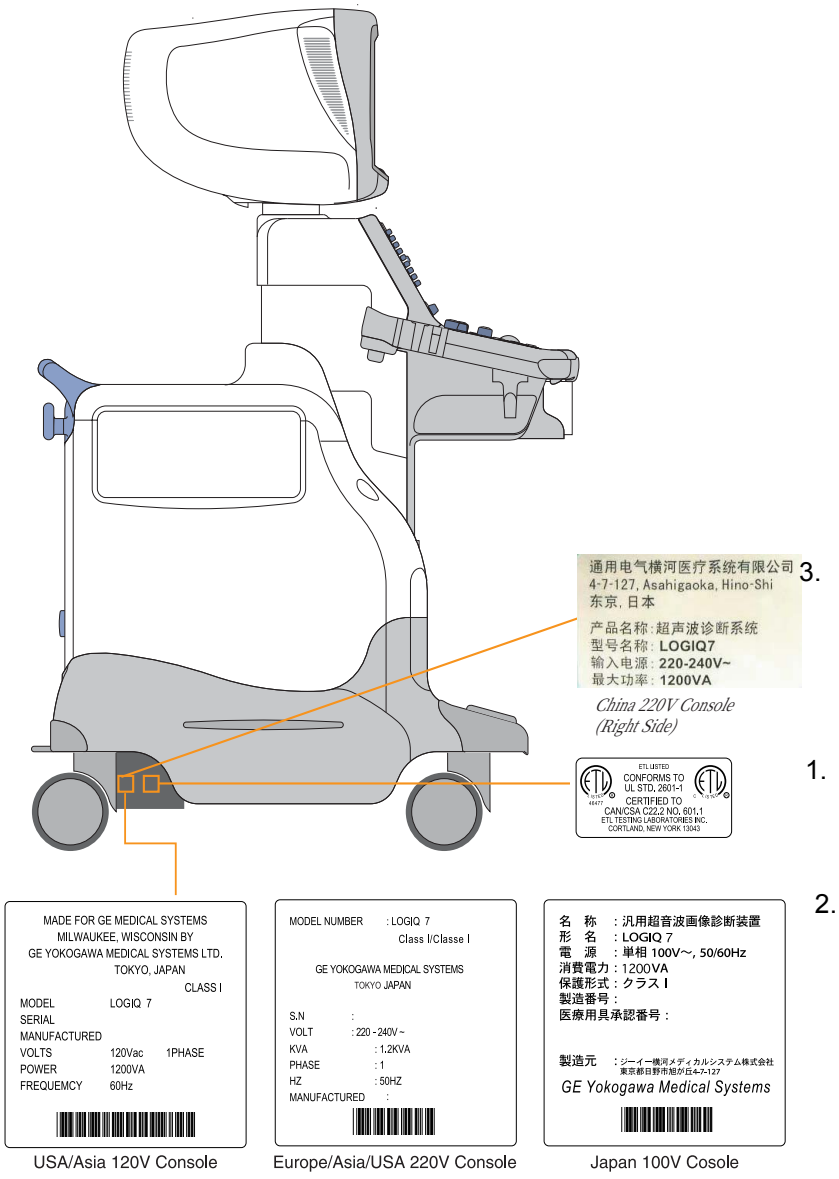


Figure 1-2 OUTSIDE MARKINGS OF LOGIQ™ 7 (Left Side)

1.) ETL Label
2.) Identification and Rating Plate
3.) SDA Label (For China ONLY)

1-3-6 Dangerous Procedure Warnings

Warnings, such as the example below, precede potentially dangerous procedures through our this manual. Instructions contained in the warnings must be followed.

DANGER **DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS EQUIPMENT. USE EXTREME CAUTION WHEN HANDLING, TESTING AND ADJUSTING.**

WARNING ***EXPLOSION WARNING: DO NOT OPERATE THE EQUIPMENT IN AN EXPLOSIVE ATMOSPHERE. OPERATION OF ANY ELECTRICAL EQUIPMENT IN SUCH AN ENVIRONMENT CONSTITUTES A DEFINITE SAFETY HAZARD.***

WARNING ***DO NOT SUBSTITUTE PARTS OR MODIFY EQUIPMENT: BECAUSE OF THE DANGER OF INTERDICTING ADDITIONAL HAZARDS, DO NOT INSTALL SUBSTITUTE PARTS OR PERFORM ANY UNAUTHORIZED MODIFICATION OF THE EQUIPMENT.***

1-3-7 Lockout/Tagout Requirements

Follow OSHA Lockout/Tagout requirements by ensuring you are in total control of the plug.

1-3-8 Returning/Shipping Probes and Repair Parts

Equipment being returned must be clean and free of blood and other infectious substances.

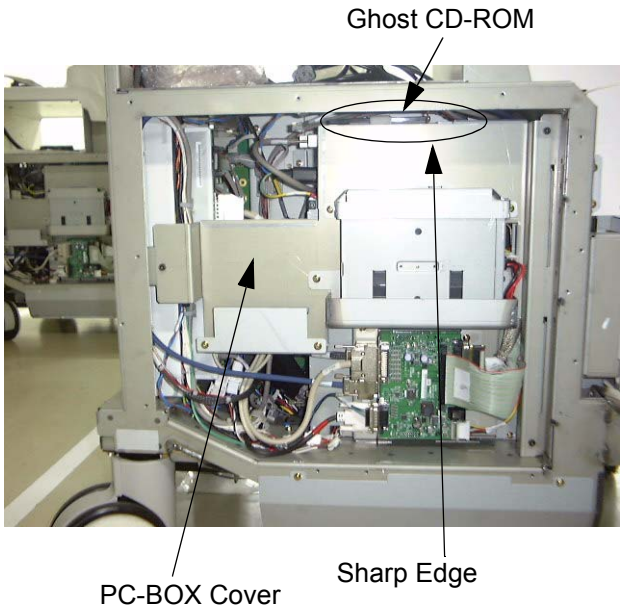
GEMS policy states that body fluids must be properly removed from any part or equipment prior to shipment. GEMS employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe).

The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

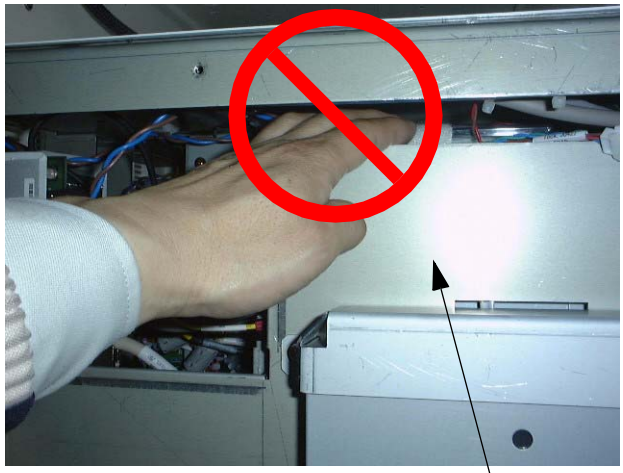
NOTE: The US Department of Transportation (DOT) has ruled that "items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care" are "regulated medical waste" for transportation purposes and must be transported as a hazardous material.

1-3-9 How to remove the Ghost CD-ROM

The Ghost CD-ROM (Base System Software Load Image CD-ROM) is mounted on the PC-BOX inside the scanner using velcro tapes. The upper side of the PC-BOX cover contains sharp edge causing a FE to have possibility of cutting his hand if he removes the CD-ROM with the PC-BOX cover closed.



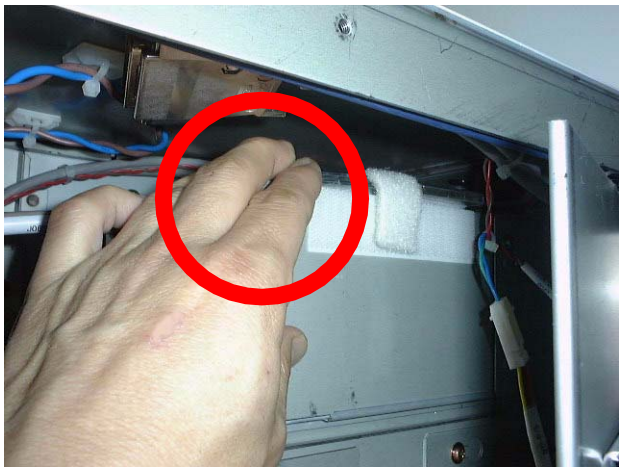
NG: WITH PC BOX COVER CLOSED



Do NOT remove the Ghost CD-ROM when the PC-Box cover is closed.

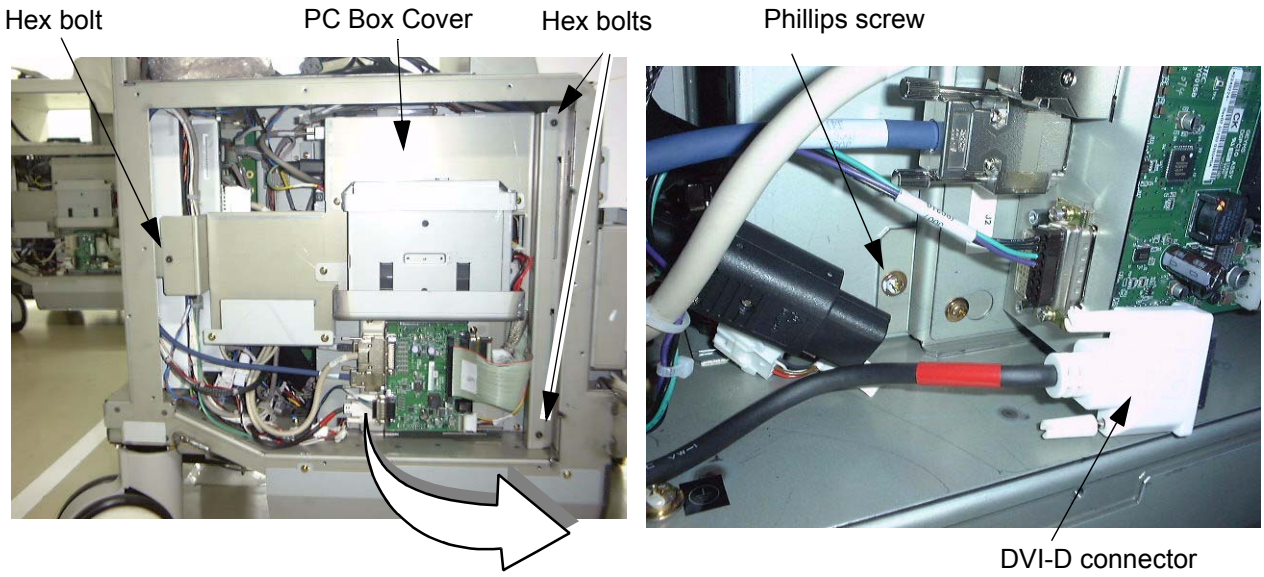
PC-BOX Cover

OK: WITH PC BOX COVER OPEN

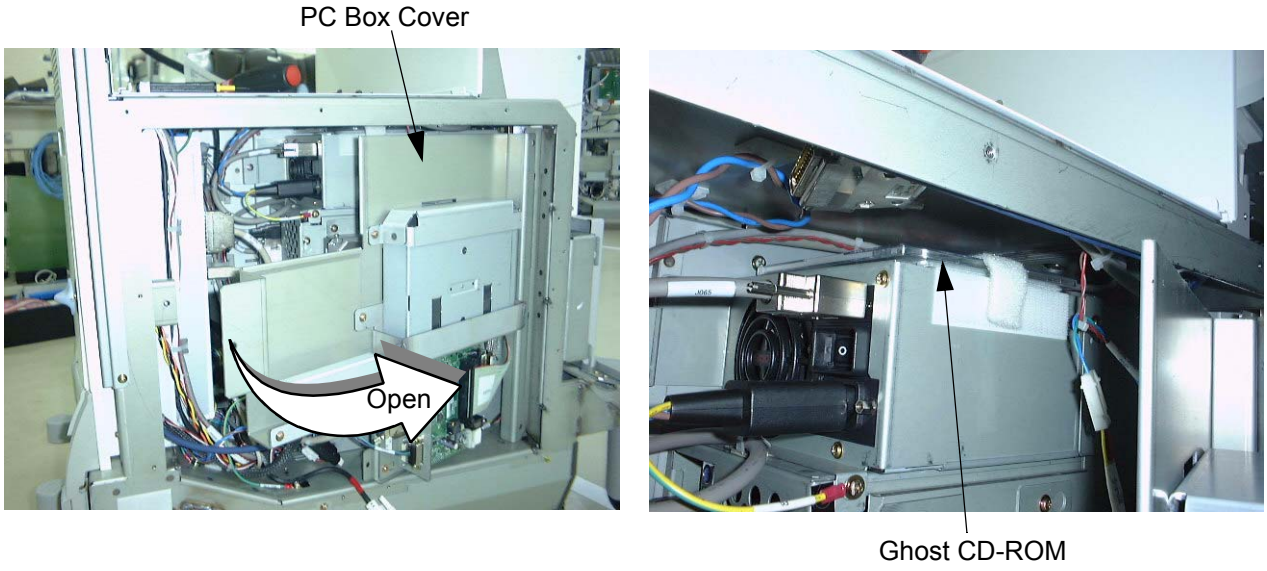


The sharp edge of the PC Box Cover are chamfered before shipment. However, the Ghost CD-ROM must be removed with the PC-Box cover open according to the following steps.

1.) Disconnect the DVI-D connector, then remove the four mounting bolts (three hex bolts and one phillips screw).



2.) Open the PC box cover and remove the Ghost CD-ROM from the PC box.



Section 1-4
EMC, EMI, and ESD

1-4-1 Electromagnetic Compatibility

Electro Magnetic Compatibility describes a level of performance of a device within its electromagnetic environment. This environment consists of the device itself and its surroundings including other equipment, power sources and persons with which the device must interface. Inadequate compatibility results when a susceptible device fails to perform as intended due interface from its environment or when the device produces unacceptable levels of mission to its environment. This interface is often referred to as radio-frequency or electromagnetic interface (RFI/EMI) and can be radiated through space or conducted over interconnecting power of signal cables. In addition to electromagnetic energy, EMC also includes possible effects from electrical fields, magnetic fields, electrostatic discharge and disturbances in the electrical power supply.

1-4-2 Electrostatic Discharge (ESD) Prevention

⚠ **WARNING** ***DO NOT TOUCH ANY BOARDS WITH INTEGRATED CIRCUITS PRIOR TO TAKING THE NECESSARY ESD PRECAUTIONS:***

1.) Always connect yourself, via an arm-wrist strap, to the dedicated ground point located on the rear of the scanner (to the left of the power connector) or a proper frame ground.

2.) Follow general guide lined for handling of electrostatic sensitive equipment.

1-4-3 CE Compliance

The LOGIQ™ 7 unit conforms to all applicable conducted and radiated emission limits and immunity from electrostatic discharge, radiated and conducted RF fields, magnetic fields and power line transient requirements.

Applicable standards are: 47CFR Part18, IEC601-1-2, and 806-13. TBD

NOTE: For CE Compliance, it is critical that all covers, screws, shielding, gaskets, mesh, clamps, are in good condition, installed tightly without skew or stress. Proper installation following all comments noted in this service manual is required in order to achieve full EMC performance.

Section 1-5
Customer Assistance

This system is not repairable by the customer. If this equipment does not work as indicated in the Operator Manual, please contact your service support center. If the service engineer needs additional information to repair this equipment, please contact the following address (The necessary information will be provided to the Service Engineer as needed).

1-5-1 System Manufacture

Table 1-6 System Manufacture

GE YOKOGAWA MEDICAL SYSTEMS
On-Line Center (OLC), Asia Ultrasound Group 67-4 Takakura-cho, Hachioji-shi, Tokyo, 192-0033 JAPAN TEL: (81) 426-48-2940 FAX: (81) 426-48-2905

1-5-2 Contact Information

For GE Service:

Table 1-7 GE Service

Location	Phone Number
USA	(1) 800-437-1171
CANADA	(1) 800-668-0732
LATIN&SOUTH AMERICA	(1) 305-735-2304
ASIA	(65) 277-3512
EUROPE	(49) (212) 2802 207

NOTE: If this equipment does not work as indicated in the Operator Manual(s), contact your support center. Have the system ID number available when you call.

Chapter 2
Pre Installation

Section 2-1
Overview

2-1-1 Purpose of this chapter 2

This chapter provides the information required to plan and prepare for the installation of a LOGIQ™ 7. Included are descriptions of the facility and electrical needs to be met by the purchaser of the unit. A checklist is also provided at the end of this section to help determine whether the proper planning and preparation is accomplished before the actual equipment installation is scheduled.

Table 2-8 Contents in Chapter 2

Section 2-2
General Console Requirements

2-2-1 Console Environmental Requirements

Table 2-9 Environmental Requirements for LOGIQ™ 7 Scanners

	Operational	Storage	Transport
Temperature	10 - 30 °C 50 - 104 °F	-10 - 60 °C 14 - 140 °F	-40 - 60 °C -40 - 140 °F
Humidity	30 - 85% non-condensing	30 - 90% non-condensing	30 - 90% non-condensing
Pressure	700 - 1060hPa	700 - 1060hPa	700 - 1060hPa

Table 2-10 Environmental Requirements for an Ultrasound Room

Item	Values
Power Source	Refer to Table 2-11 on page 2-3.
Current Rating	20A (115V, 100V); 7.5A (220-240V) CIRCUIT BREAKER
Radiation Shielding	NONE REQUIRED for ULTRASOUND ENERGY
Temperature	20-26 DEG. C (68-79 DEG F) for PATIENT COMFORT
Humidity	50% to 70% for PATIENT COMFORT
Heat Dissipation	3500 BTU/Hr.
Floor Landing	Approximately 680 - 800 kg/m^2 without Accessories
Floor Condition	Gradient: WITHIN 5 degrees
Weight	Approximately 225 kg (496lbs) without Accessories

2-2-1-1 Cooling

The cooling requirement for the LOGIQ™ 7 is 3500 BTU/hr. This figure does not include cooling needed for lights, people, or other equipment in the room. Each person in the room places an additional 300 BTU/hr. demand on the cooling system.

2-2-1-2 Lighting

Bright light is needed for system installation, updates and repairs. However, operator and patient comfort may be optimized if the room light is subdued and indirect. Therefore a combination lighting system (dim/bright) is recommended. Keep in mind that lighting controls and diameters can be a source of EMI which could degrade image quality. These controls should be selected to minimize possible interface.

2-2-2 Electrical Requirements

2-2-2-1 Electrical Requirements

NOTE: GE Medical Systems requires a dedicated power and ground for the proper operation of its Ultrasound equipment. This dedicated power shall originate at the last distribution panel before the system.

*Sites with a mains power system **with defined Neutral** and Line:*
The dedicated line shall consist of one phase, a neutral (not shared with any other circuit), and a full size ground wire from the distribution panel to the Ultrasound outlet.

*Sites with a mains power system **without a defined Neutral**:*
The dedicated line shall consist of one phase (two lines), not shared with any other circuit, and a full size ground wire from the distribution panel to the Ultrasound outlet.

Please note that image artifacts can occur, if at any time within the facility, the ground from the main facility's incoming power source to the Ultrasound unit is only a conduit.

2-2-2-2 LOGIQ™ 7 Power Requirements

The following power line parameters should be monitored for one week before installation. We recommend that you use an analyzer Dranetz Model 606-3 or Dranetz Model 626:

Table 2-11 Electrical Specifications for LOGIQ™ 7

PARAMETER	AREA	LIMITS
Voltage Range	100V	100 VAC ±10% (90-110 VAC)
	220V	220-240 VAC ±10% (198-264 VAC)
	115V	115 VAC ±10% (103-127 VAC)
Power	All applications	MAX. 1200 VA
Line Frequency	All applications	50/60Hz (±2Hz)
Power Transients	All applications	Less than 25% of nominal peak voltage for less than 1 millisecond for any type of transient, including line frequency, synchronous, asynchronous, or aperiodic transients.
Decaying Oscillation	All applications	Less than 15% of peak voltage for less than 1 millisecond.

2-2-2-3 Inrush Current

Inrush Current is not a factor to consider due to the inrush current limiting properties of the power supplies.

2-2-2-4 Site Circuit Breaker

It is recommended that the branch circuit breaker for the machine be ready accessible.

CAUTION **POWER OUTAGE MAY OCCURE. The LOGIQ™ 7 requires a dedicated single branch circuit. To avoid circuit overload and possible loss of critical care equipment, make sure you DO NOT have any other equipment operating on the same circuit.**

2-2-2-5 Site Power Outlets

A desiccated AC power outlet must be within reach of the unit without extension cords. Other outlets adequate for the external peripherals, medical and test equipment needed to support this unit must also be present within 1 m (3.2 ft.) of the unit. Electrical installation must meet all current local, state, and national electrical codes.

2-2-2-6 Unit Power Plug

If the unit arrives without the power plug, or with the wrong plug, you must contact your GE dealer or the installation engineer must supply what is locally required.

2-2-2-7 Power Stability Requirements

Voltage drop-out
Max 10 ms.

Power Transients
Refer Table

2-2-3 EMI Limitations

Ultrasound machines are susceptible to Electromagnetic Interference (EMI) from radio frequencies, magnetic fields, and transient in the air wiring. They also generate EMI. The LOGIQ™ 7 complies with limits as stated on the EMC label. However there is no guarantee that interface will not occur in a particular installation.

Possible EMI sources should be identified before the unit is installed.

Electrical and electronic equipment may produce EMI unintentionally as the result of defect.

These sources include:

- medical lasers,
- scanners,
- cauterizing guns,
- computers,
- monitors,
- fans,
- gel warmers,
- microwave ovens,
- light dimmers,
- portable phones.

The presence of broadcast station or broadcast van may also cause interference. See for EMI Prevention tips.

Table 2-12 EMI Prevention/abatement

EMI Rule	Details
Be aware of RF sources	Keep the unit at least 5 meters or 15 feet away from other EMI sources. Special shielding may be required to eliminate interference problems caused by high frequency, high powered radio or video broadcast signals.
Ground the unit	Poor grounding is the most likely reason a unit will have noisy images. Check grounding of the power cord and power outlet.
Replace all screws, RF gaskets, covers, cores	After you finish repairing or updating the system, replace all covers and tighten all screws. Any cable with an external connection requires a magnet wrap at each end. Install the shield over the front of card cage. Loose or missing covers or RF gaskets allow radio frequencies to interface with the ultrasound signals.
Replace broken RF gaskets	If more than 20% or a pair of fingers on the RF gaskets are broken, replace the gaskets. Do not turn on the unit until any loose metallic part is removed.
Do not place labels where RF gaskets touch metal	Never place a label where RF gaskets meet the unit. Otherwise, the gap created will permit RF leakage. Or, if a label has been found in such a position, move the label.
Use GE specified harnesses and peripherals	The interconnect cables are grounded and require ferrite beads and other shielding. Also, cable length, material, and routing are all important; do not change from what is specified.
Take care with cellular phones	Cellular phones may transmit a 5 V/m signal; that could cause image artifacts.
Properly dress peripheral cables	Do not allow cables to lie across the top of the card cage or hang out of the peripheral bays. Loop the excess length for peripheral cables inside the peripheral bays. Attach the monitor cables to the frame.

2-2-4 Probes Environmental Requirements

Table 2-13 Operation and storage Temperatures for Probes

	ELECTRONIC	PAMPTE
Operation:	10 to 40 ^{o}C	5 to 42.7 ^{o}C
Storage:	-20 to 50 ^{o}C	-20 to 50 ^{o}C
Temperatures in ^{o}C, conversion to ^{o}F = ^{o}C*(9/5) + 32)		

Section 2-3
Facility Needs

2-3-1 Purchaser Responsibilities

The work and materials needed to prepare the site is the responsibility of the purchaser. Delay, confusion, and waste of manpower can be avoided by completing pre installation work before delivery. User the Pre Installation checklist to verify that all needed steps have been taken,
Purchaser reasonability includes:

- Procuring the materials required.
- Completing the preparations before delivery of the ultrasound system.
- Paying the costs for any alternations and modifications not specifically provided in the sales contract.

NOTE: All electrical installation that are preliminary to the positioning of the equipment at the site prepared for the equipment must be performed by licensed electrical contractors. Other connections between pieces of electrical equipment, products involved (and the accompanying electrical installations) are highly sophisticated and special engineering competence is required. All electrical work on these product must comply with the requirements of applicable electrical codes. The purchaser of GE equipment must only utilize qualified personnel to perform electrical servicing on the equipment.

The desire to use a non-listed or customer provided product or to place an approved product further from the system than the interface kit allows presents challenges to the installation team. To avoid delays during installation, such variances should be made known to the individuals or group performing the installation at the earliest possible date (preferable prior to purchase).
The ultrasound suite must be clean proof to delivery of the machine. Carpet is not recommended because it collects dust and creates static. Potential sources of EMI (electromagnetic interference) should also be investigated before delivery. Dirt, static, and EMI can negatively impact system.

2-3-2 Required Features

- Dedicated single branch power outlet of adequate amperage (see *Table 2-10*) meeting all local and national codes which is located less than 2.5 m (8 ft.) from the unit's proposed location
- Door opening is at least 76 cm (30 in) wide
- Proposed location for unit is at least 0.3 m (1 ft.) from the wall for cooling
- Power outlet and place for any external peripheral are within 2 m (6.5 ft.) of each other with peripheral within 1 m of the unit to connect cables.

NOTE: The LOGIQ™ 7 has four outlets inside the unit. One is for the monitor and three for on board peripherals.

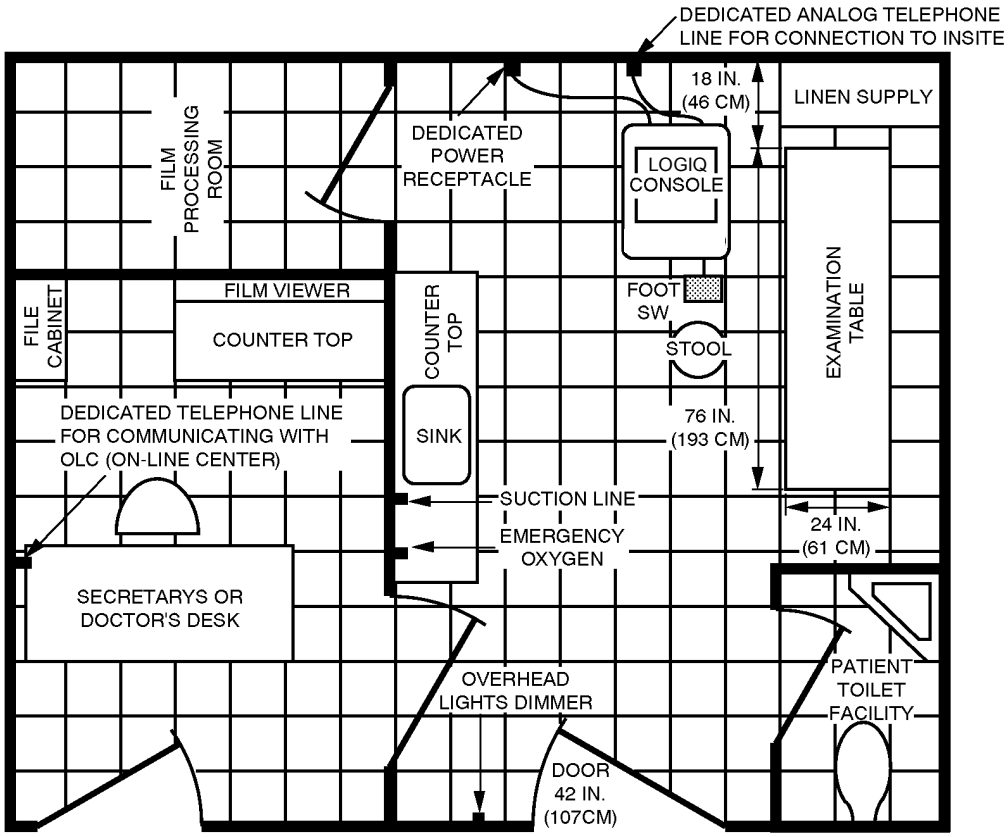
- Power outlets for other medical equipment and gel warmer
- Power outlets for test equipment and modem within 1 m (3.2 ft.) of unit
- Clean and protected space to store transducers (in their cases or on a rack)
- Material to safely clean probes (done with a plastic container, never metal)

2-3-3 Desirable Ultrasound Room Facilities

- Door is at least 92 cm (3 ft.) wide
- Circuit breaker for dedicated power outlet is easily accessible
- Sink with hot and cold water
- Receptacle for bio–hazardous waste, like used probe sheaths
- Emergency oxygen supply
- Storage for linens and equipment
- Nearby waiting room, lavatory, and dressing room
- Dual level lighting (bright and dim)
- Lockable cabinet ordered by GE for its software and proprietary manuals

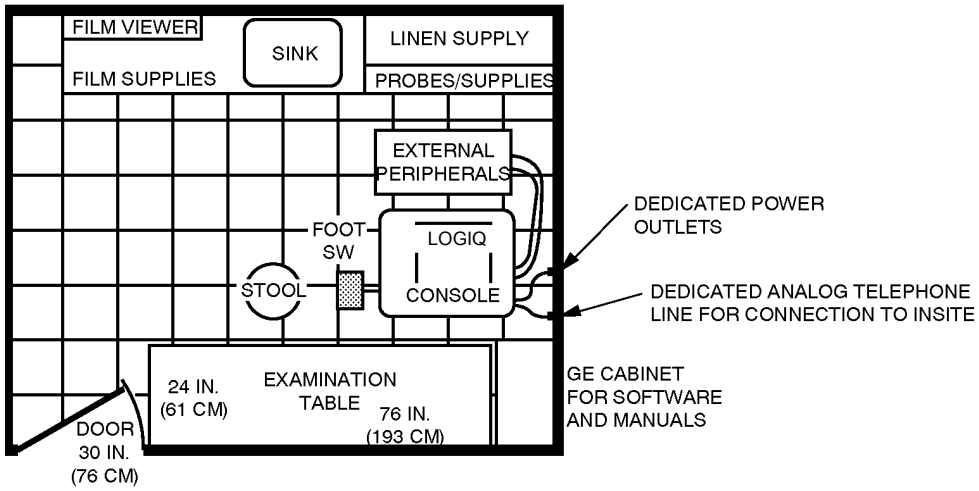
2-3-4 Recommended and Alternate Ultrasound Room Layout

Recommended standard floor plan and a minimal floor plan for ultrasound equipment:



A 14 by 17 foot Recommended Floor Plan

Scale: Each square equals one square foot



An 8 by 10 foot Minimal Floor Plan

Figure 2-3 RECOMMENDED ULTRASOUND ROOM LAYOUT

2-3-5 Networking Pre-installation Requirements

2-3-5-1 Purpose of DICOM Network Function

DICOM services provide the operator with clinically useful features for moving images and patient information over a hospital network. Examples of DICOM services include the transfer of images to workstations for viewing or transferring images to remote printers. As an added benefit, transferring images in this manner frees up the on-board monitor and peripherals, enabling viewing to be done while scanning continues. With DICOM, images can be archived, stored, and retrieved faster, easier, and at a lower cost.

2-3-5-2 DICOM Option Pre-installation Requirements

To configure the LOGIQ™ 7 to work with other network connections, the site's network administrator must provide some necessary information.

Information must include:

- A host name, local port number, AE Title, IP address and Net Mask for the LOGIQ™ 7.
- The IP addresses for the default gateway and other routers at the site for ROUTING INFORMATION.
- The host name, IP address, port and AE Title for each device the site wants connected to the LOGIQ™ 7 for DICOM APPLICATION INFORMATION. A field for the make (manufacturer) and the revision of the device, is also included. This information may be useful for solving errors.

2-3-5-2 DICOM Option Pre-installation Requirements (cont'd)

LOGIQ™ 7 **Host Name** _____ **Local Port** _____ **IP Address** ___.___.___.___

AE Title _____ **Net Mask** ___.___.___.___

ROUTING INFORMATION

	Destination IP Addresses	GATEWAY IP Addresses
		Default ___.___.___.___
ROUTER1	___.___.___.___	___.___.___.___
ROUTER2	___.___.___.___	___.___.___.___
ROUTER3	___.___.___.___	___.___.___.___

DICOM APPLICATION INFORMATION

	NAME	MAKE/REVISION	AE TITLE	IP ADDRESSES	PORT
Store 1				___.___.___.___	
Store 2				___.___.___.___	
Store 3				___.___.___.___	
Store 4				___.___.___.___	
Store 5				___.___.___.___	
Store 6				___.___.___.___	
Worklist				___.___.___.___	
Storage Commit				___.___.___.___	
MPPS				___.___.___.___	

Figure 2-4 Worksheet for DICOM Network Information

Chapter 3
Installation

Section 3-1
Overview

3-1-1 Purpose of Chapter 3

This chapter contains information needed to install the unit. Included are references to a procedure that describes how to receive and unpack the equipment and how to file a damage or loss claim.
How to prepare the facility and unit of the actual installation, and how to check and test the unit, probes, and external peripherals for electrical safety are included in this procedure. Also included in this section are guidelines for transporting the unit to a new site.

Table 3-1 Contents in Chapter 3

3-1-2 Average Installation Time

Table 3-2 Average Installation Time

Description	Average Installation Time	Comments
Unpacking the scanner	0.5 hour	
Scanner wo/options	0.5 hour	Dependant on the configuration that is required
DICOM Option	0.5 hour	Dependant on the amount of configuration
InSite Option	0.5 hour	

The LOGIQ™ 7 has been designed to be installed and checked out by an experienced service technician in approximately four hours. LOGIQ™ 7 consoles with optional equipment may take slightly longer.

3-1-3 Installation Warnings

1.) Since the LOGIQ™ 7 weighs approximately 225 kg. (496 lb) without options, preferably two people should unpack it. Two people are also preferable for installing any additional bulky items.

2.) There are no operator serviceable components. To prevent shock, do not remove any covers or panels. Should problems or malfunctions occur, unplug the power cord. Only qualified service personnel should carry out servicing and troubleshooting.

3.) After being transported, the unit may be very cold or hot. If this is the case, allow the unit to acclimate before you turn it on. It requires one hour for each 2.5×C increment it's temperature is below 10×C or above 40×C.

CAUTION **Equipment damage possibility. Turning the system on without acclimation after arriving at site may cause the system to be damaged.**

Table 3-3 Time for Settlement

°C	60	55	50	45	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40
°F	140	131	122	113	104	96	86	77	68	59	50	41	32	23	14	5	-4	-13	-22	-31	-40
hrs	8	6	4	2	0	0	0	0	0	0	0	2	4	6	8	10	12	14	16	18	20

3-1-3-1 Brake Pedal Operation

WARNING ***Remember: If the front caster swivel lock is engaged for transportation, pressing the release pedal once edisengages the swicel lock. You must depress the release pedal a second time to engage the brake.***

Section 3-2
Receiving and Unpacking the Equipment

When a new system arrives, check that any components are not damaged and are not in short supply. If shipping damage or shortage occurs, contact the address shown in Chapter 1.

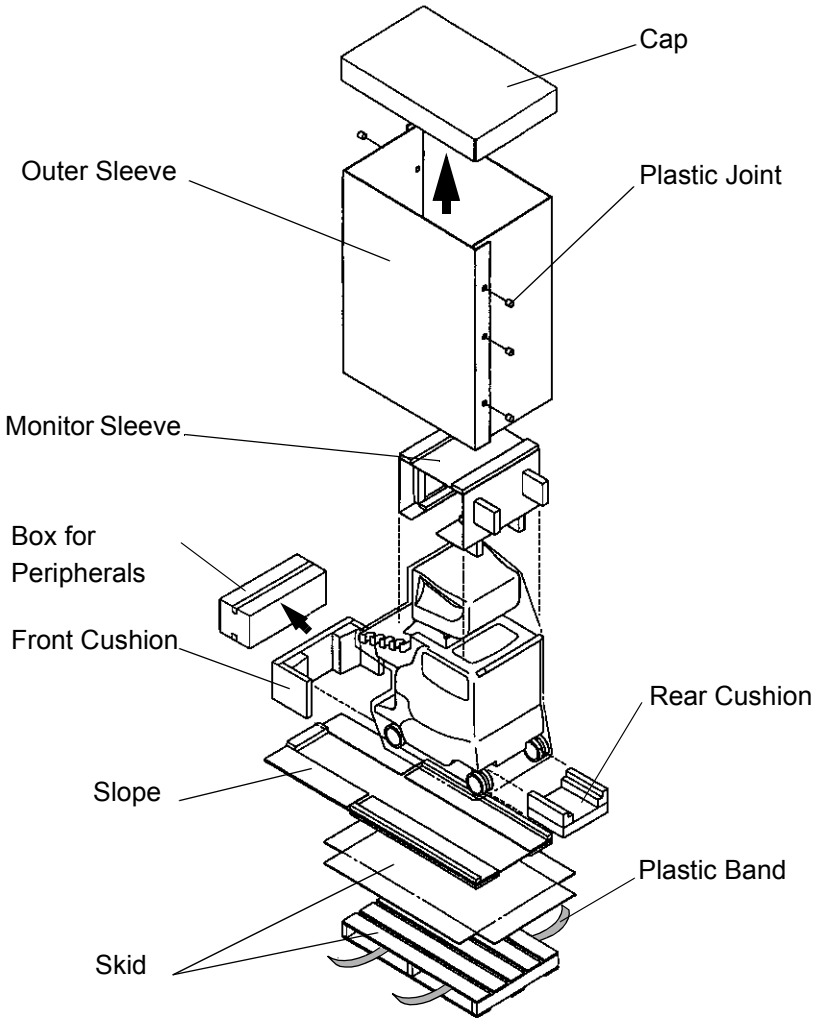


Figure 3-1 Unpacking Procedures

Unpacking Procedures:

1.) Cut the two Plastic Bands.
2.) Lift the Cap up and off.
3.) Remove the six (6) Plastic Joints from the Outer Sleeves.
4.) Remove the Outer Sleeves.
5.) Remove the Monitor Sleeve.
6.) Remove the Box for Peripherals.
7.) Remove the Front and Rear Cushions.
8.) Slide out and set up the Slope.
9.) Unlock the brakes by stepping down on the brake pedal in front, then carefully roll the LOGIQ™ 7 rear side first off the Skid.

3-2-1 Safety Reminders

DANGER **WHEN USING ANY TEST INSTRUMENT THAT IS CAPABLE OF OPENING THE AC GROUND LINE (I.E., METER'S GROUND SWITCH IS OPEN), DO NOT TOUCH THE UNIT!**

CAUTION **Two people should unpack the unit because of its weight. Two people are required whenever a part weighing 19kg (35 lb.) or more must be lifted.**

CAUTION **If the unit is very cold or hot, do not turn on its power until it has had a chance to acclimate to its operating environment.**

CAUTION **To prevent electrical shock, connect the unit to a properly grounded power outlet. Do not use a three to two prong adapter. This defeats safety grounding.**

CAUTION **Do NOT wear the ESD wrist strap when you work on live circuit and more than 30 V peak is present.**

CAUTION **Do not use a 20 Amp to 15 Amp adapter on the 120 Vac unit's power cord. This unit requires a dedicated 20 A circuit and can have a 15 A plug if the on board peripherals do not cause the unit to draw more than 14.0 amps.**

CAUTION **Do not operate this unit unless all board covers and frame panels are securely in place. System performance and cooling require this.**

CAUTION **OPERATOR MANUAL(S)**
The User Manual(s) should be fully read and understood before operating the LOGIQ™ 7 and kept near the unit for quick reference.

CAUTION **ACOUSTIC OUTPUT HAZARD**
Although the ultrasound energy transmitted from the LOGIQ™ 7 probe is within FDA limits, avoid unnecessary exposure. Ultrasound energy can produce heat and mechanical damage.

CAUTION **Do not lift the unit by the Keyboard. Equipment damage may result.**

CAUTION **The crate with the LOGIQ™ 7 weighs approximately 340 kg. (749.7 lb) Be prepared for a sudden shift of weight as the unit is removed from its base (pallet)**

NOTE: Check the shipping container for special instructions. Verify that the container is intact. In some cases a secondary container may be used. If so, ask the carrier for unpacking instructions.

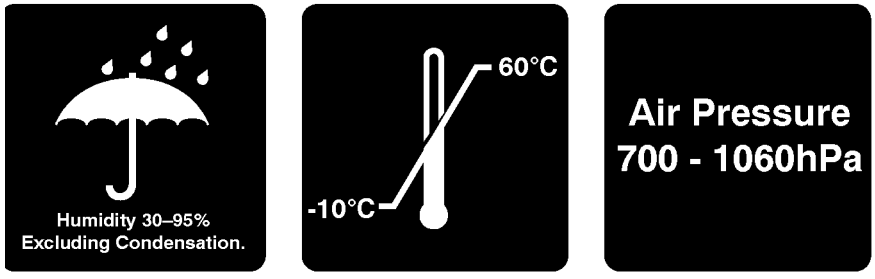


Figure 3-2 Labels on Package

3-2-2 Moving into Position

CAUTION **Do not lift the unit by the Keyboard.**
Do not tilt the unit more than 5 degrees to avoid tipping it over.
To avoid injury by tipping over. Set the monitor to the lowest position before moving.

CAUTION **Equipment Damage Possibility. Lifting the console by holding covers may damage the covers.**
Do not lift the console by holding any covers.

In general, a single adult can move the LOGIQ™ 7 along an even surface with no steep grades. At least two people should move the machine when large humps, grooves, or grades will be encountered. (It is better to pull from the rear rather than push from the front of the unit). Before moving, store all loose parts in the unit. Wrap transducers in soft cloth or foam to prevent damage.

Although LOGIQ™ 7 is a compact and mobile machine, two people should move it over rough surfaces or up and down grades.

3-2-3 Adjusting System Clock

Set the system clock for the LOGIQ™ 7 to the local time. For procedure of adjusting the system clock, refer to See System Configuration, Section 3-5 on page 3-9

Fill out proper customer Information the Product Locator Installation Card. Mail this Installation Card “Product Locator” to the address corresponding to your pole.

3-2-4 Product Locator Installation Card

NOTE: The Product Locator Installation Card shown may not be same as the provided Product Locator card.

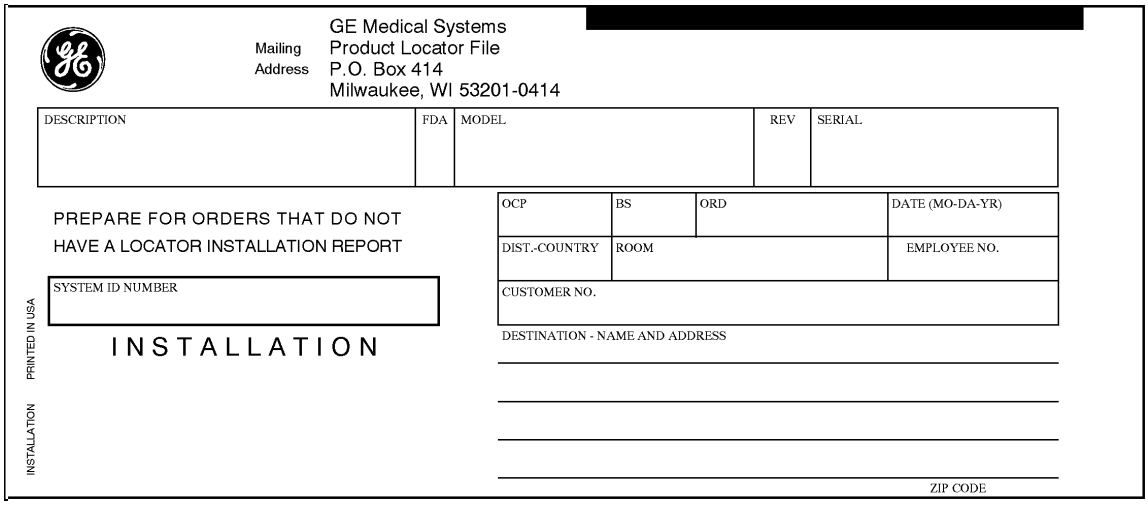


Figure 3-3 Product Locator Installation Card

Section 3-3
Preparing for Installation

3-3-1 Physical Inspection

3-3-1-1 System Voltage Settings

- Verify that the scanner is set to the correct voltage. The Voltage settings for the LOGIQ™ 7 Scanner is found on a label to the right of the Power switch and External I/O, on the rear of the system.

⚠ **WARNING** ***Connecting a LOGIQ™ 7 scanner to the wrong voltage level will most likely destroy the scanner.***

⚠ **WARNING** ***Protective earth must be taken when connecting AC power cable (200V) without its plug to wall outlet.***

3-3-2 EMI Protection

This Unit has been designed to minimize the effects of Electro Magnetic Interference (EMI). Many of the covers, shields, and screws are provided primarily to protect the system from image artifacts caused by this interference. For this reason, it is imperative that all covers and hardware are installed and secured before the unit is put into operation.

Section 3-4
Completing the Installation

3-4-1 System Specifications

3-4-1-1 Physical Dimensions

The physical dimensions of the LOGIQ™ 7 unit are summarized in Table 3-4 on page 7. The Size of LOGIQ™ 7, with monitor and peripherals

Table 3-4 Physical Dimensions of LOGIQ™ 7

Height	Width	Depth	Unit
142.8 - 162.8	59.9	99.9	cm
56 - 64	24	39	inches

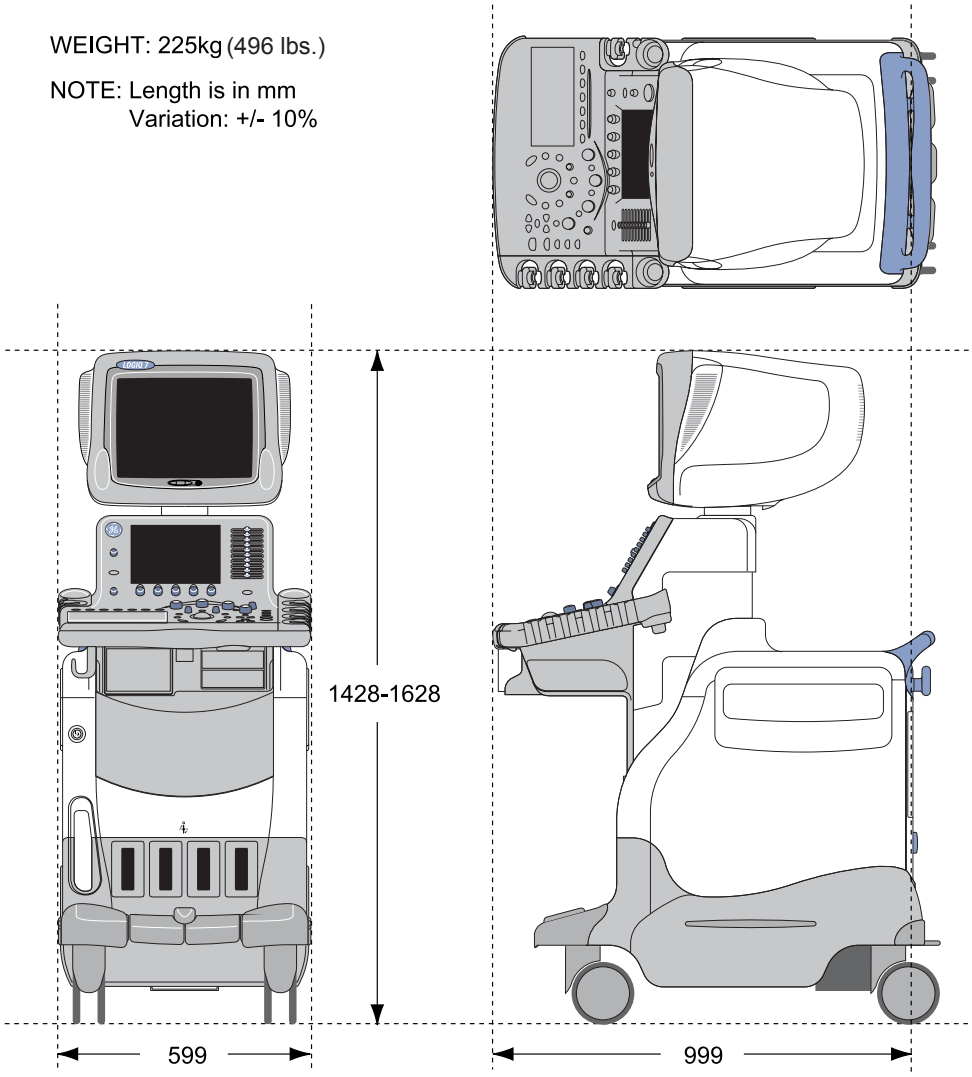


Figure 3-4 Overall Dimensions

3-4-1-2 Weight without Peripherals

The Weight of LOGIQ™ 7 with monitor, without peripherals

Table 3-5 Weight of LOGIQ™ 7

Model	Weight [kg]	Weight [lbs]
LOGIQ™ 7	Approximately 225	Approximately 496

3-4-1-3 Acoustic Noise Output:

Less than 70dB (A) according to DIN 45635 - 19 - 01 - KL2.

3-4-2 Electrical Specifications

Electrical Specifications for LOGIQ™ 7.

Table 3-6 Electrical Specifications for LOGIQ™ 7

Voltage	Tolerances	Current	Frequency
100 VAC	90-110 VAC	20 amp	50/60 Hz
115 VAC	103-127 VAC		
220 VAC	198-264 VAC	7.5 amp	

3-4-3 Probe (Transducer) Connection

1.) Connect a transducer to the upper transducer receptacle as follows:

NOTICE To make effective use of the memory space:
1. When a scanner has one linear probe, it must be connected to the most left receptacle.
2. When a scanner has several linear probes, they must be connected from the left to the right.

a.) Ensure that the transducer twist lock lever to the horizontal position.

b.) Insert the transducer connector on the receptacle guide pin until it touches the receptacle mating surface.

c.) Twist the transducer twist lock lever to vertical position to lock it in place. Twist the lever to the horizontal position to disconnect the transducer.

NOTE: It is not necessary to turn OFF power to connect or disconnect a transducer.

2.) Connect the main power cable to a hospital grade power receptacle with the proper rated voltage checked during pre installation. Never use a three-to-two prong adapter; this defeats the safety ground.

3-4-4 Power On/Boot Up

Refer to 4-2-1 Power ON /Boot-up.

Section 3-5
System Configuration

3-5-1 System Configuration

3-5-1-1 System Settings

Table 3-7 System Configuration

Configuration Category	Description
Settings	Enables the user or service personnel to set the date, time, unit, language, basic information about the organization such as the institution name and department.

1.) Power OFF the scanner.

2.) The SYSTEM EXIT window appears. Click on **Logoff.**

Figure 3-5 System EXIT window

3.) The message window appears. Click on **OK.**

4.) The OPERATOR LOGIN window appears.
Change the User level to **Admin,** then enter **Password**. Then click on **Log on.**

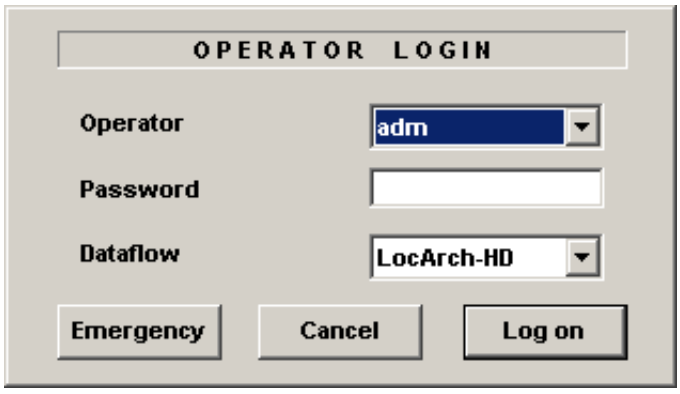


Figure 3-6 Operator LOGIN window

3-5-1-1 System Settings (cont'd)

5.) Select **Utility > System**

6.) Set the **Hospital name, Department, Date/Time and Time Zone, Language,** and **Units.**

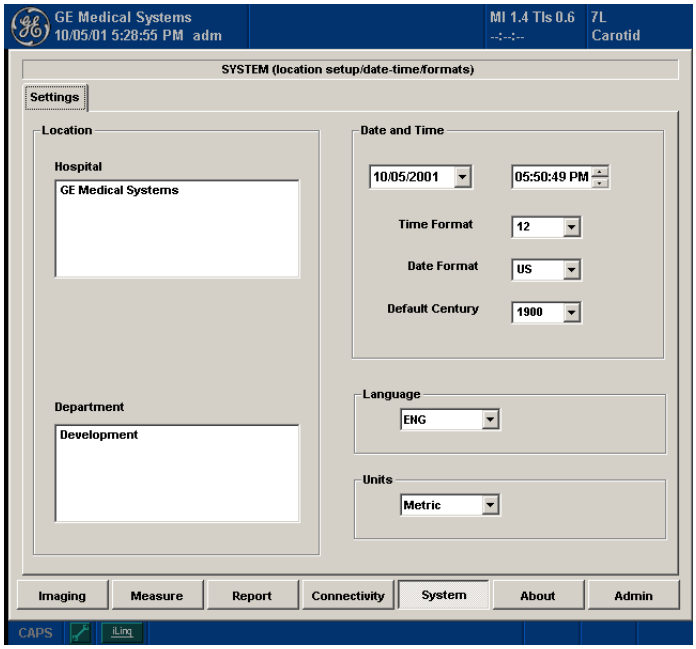


Figure 3-7 Setting Display

7.) Click on **Utilities** to terminate the utility function.

3-5-2 Optional Peripherals/Peripheral Connection

See the Internal and External I/O description in Chapter 5.

3-5-2-1 Approved on-board peripherals

The tables below shows the suggested optional peripherals for LOGIQ 7.

Recording Devices

Table 3-8 List of Recording Devices

Device	Manufacturer	Model	Video Signal
B/W Video Printer	SONY	UP-895MDW	NTSC/PAL
	Mitsubishi	P-93W (AP-03M) P-91(AP9500) P91W P91E	NTSC/PAL NTSC/PAL NTSC/PAL NTSC/PAL
Video Cassette Recorder	SONY	SVO-9500MD SVO-9500-MDP	NTSC PAL
	Panasonic	AG-MD835 AG-MD835P AG-MD835E	NTSC NTSC PAL
A6 Color Video Printer	SONY	UP-21MD UP-21MDS	NTSC/PAL NTSC
	Mitsubishi	CP-900 CP900UM CP-900E	NTSC NTSC PAL
A5 Color Video Printer	SONY	UP-50 UP51MD	NTSC NTSC/PAL
	Mitsubishi	CP-800 CP-800UM CP800E	NTSC NTSC PAL
Digital B/W Printer	SONY	UP-D895 P91D/P91DW	Digital (USB) Digital (USB)
A6 Digital Color Printer	SONY	UP-D21MD	Digital (USB)
A5 Digital Color Printer (U.S.A. Only)	SONY	UP-D50	Digital (USB)
PC printer	HP	HP990	-

NOTE: See each option installation instructions for installation and connection procedures.

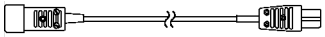
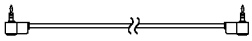
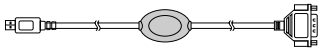
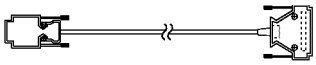
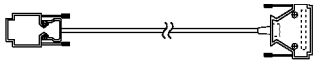
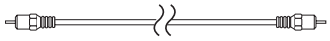
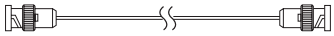
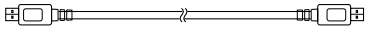
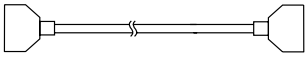
NOTE: For SONY D21MD color printer ONLY:
The D21MD printer contains the L-sized ribbon cassette and paper as a standard. However, the S-sized paper is recommended for LOGIQ 7 system. If the S-sized paper is used with the L-sized ribbon cassette, "Incorrect paper size setting" error occurs with no print.
So, when using the S-sized paper, change the ribbon cassette to the S-sized.

3-5-2-1 Approved on-board peripherals (cont'd)

Connecting Cables

CAUTION Equipment damage possibility. Be sure to use the following recommended connecting cables to connect recording devices and a network with LOGIQ™ 7 console.

Table 3-9 List of Connecting Cables

Name	Part No.	Figure	NOTE
Power Supply Cable	P9509EE		Connected to power
Mini-Plug Cable	P9509BE		Shutter control signals: connected to B/W Printer
USB Serial Bridge Cable	2304621		For converting the signal of RS232C cable to USB cable: connected to VCR1 on the Rear Panel
RS232C Cable Cross	2305550		For control signals: connected to Serial Bridge Cable
RS232C Cable Straight	2305549		For control signals: connected to Serial Bridge Cable
AV Cable	2119874		Connected to Video-In/Out on the Rear Panel
BNC Cable	2297053		For control signal: connected to Composite B/W
USB Cable	2324360		Connected to USB port.
SCSI cables (UP-D50 ONLY)	2375479		Connected toSCSI port and SCSI Cable Connector.

3-5-2-1 Approved on-board peripherals (cont'd)

Power Consumption of Optional Peripherals

Table 3-10 Power Consumption of Optional Recording Devices

DEVICE	MODEL	POWER CONSUMPTION
B/W Video Printer	UP-895MDW P-93W (AP-03M)	1.5A
	P-91(AP9500) P91W P91E	110W
Video Cassette Recorder	SVO-9500MD SVO-9500-MDP	1.2A
	AG-MD835 AG-MD835P AG-MD835E	28W
A6 Color Video Printer	UP-21MD UP-21MDS	180W
	CP-900 CP900UM CP-900E	2.3A
A5 Color Video Printer	UP-50 UP51MD	2.8A
	CP-800 CP-800UM CP800E	1.7A

3-5-2-2 Reference off-board peripherals and options

None.

3-5-3 Available Probes

See in specification in the LOGIQ™ 7 Reference Manual for Probes and intended use.
See Chapter 9 - Renewal Parts for Part Numbers to be used when ordering new or replacement probes.

Table 3-11 List of Transducers

Probe Name	Material of Headshell	Area of Using	TYPE	Catalog Number	Part Number
3C	PES	ABDOMINAL	CONVEX	H79802P H40412LB	2286353 2286354
5C	PES	ABDOMINAL	CONVEX	H79822P H40412LA	2294515 2294516
8C	PBT	NEONATAL PEDIATRICS	MICRO-CONVEX	H79792P H40412LJ	2348093 2348094
E8C	NORYL PBT	TRANSVAGINAL	MICRO-CONVEX	H79852P H40412LE	2294640 2294641
M7C	PBT	ABDOMINAL	CONVEX	H79832P H40412LC	2294513 2294514
M12L	PBT	SMALL PARTS	LINEAR	H79842P H40412LD	2294510 2294511
7L	NORYL	ABDOMINAL SUPERFICIAL	LINEAR	H79862P H40412LF	2294520 2294521
10L	NORYL	SUPERFICIAL	LINEAR	H79872P H40412LG	2294522 2294523
10S	ABS	PEDIATRIC	SECTOR	H79922P H4901PC	2309478 2298589
3.5C	NORYL	ABDOMINAL	CONVEX	H79812P H4901PE	2303215 2296158
3.5CS	NORYL	ABDOMINAL	CONVEX	H78042P H40412LK	2380854 2051858
3S	NORYL	CARDIOLOGY	SECTOR	H79632P H4701SZ	2348878 2323337
i12L	ABS	INTRAOPERATIVE	LINEAR	H79322P H4012L	2270556 2264883
M3S	PBT	CARDIOLOGY	SECTOR	H79892P H45011SZ	2293726 2295649
6T TEE	PU: PolyUrethane	TRASOPHAGEAL FOR ADULT CARDIOLOGY	SECTOR	H79932P H45001YD	2294534 KN100022

NOTE: PES: Polyethersulfone NORYL: Modified Polyphenylene Oxide PU: Polyurethane PBT: Polybutylene Terephthalate ABS: Acrylonitrile Butadiene Styrene

NOTE: Some probes indicated on the table above have two different part numbers. The upper row shows the part numbers of probes for Japan. The lower row shows the part numbers of probes for regions other than Japan. Probes which have only one part number are not available in Japan.

3-5-4 Video Specification

Table 3-12 Video Specifications

Timing Parameter	800x600 75Hz
Horizontal Rate [kHz]	46.88
Horizontal Period [µs]	21.33
Pixel Clock [MHz]	49.50
H Blank Width [µs]	5.17
H Sync Width [µs]	1.62
H Front Porch [µs]	0.32
Active Horizontal Period [µs]	16.16
Vertical Rate [Hz]	75.00
Vertical Period [ms]	13.33
V Sync Width [lines=ms]	25=0.53
V Front Porch [lines=µs]	3=64.00
Equalization Gate [lines=µs]	1=21.3
Lines: Field/Frame	625
Active Lines/Frame	600

3-5-5 Software Option Configuration

3-5-5-1 Onsite check and configuration

Select **Utility > Admin > System Admin** and check the option software to be installed.

Section 3-6
Installation Paperwork

NOTE: During and after installation, the documentation (i.e. Users Manual, Installation Manuals...) for the peripheral units must be kept as part of the original system documentation. This will ensure that all relevant safety and user informations are available during the operation and service of the complete system.

3-6-1 Peripherals/Accessories Connector Panel

LOGIQ™ 7 peripherals and accessories can be properly connected using the rear connector panel located behind the rear door, front connector panel located next to the video printer, and Footswitch connector located bottom of the OP panel.

3-6-1-1 Rear Panel Connector

Located on the rear panel are video input and output connectors, audio input and output, camera expose connectors, footswitch connector power connector and control connections for VCR, printer, and service tools.

This section indicates the pin assignment for each connector.

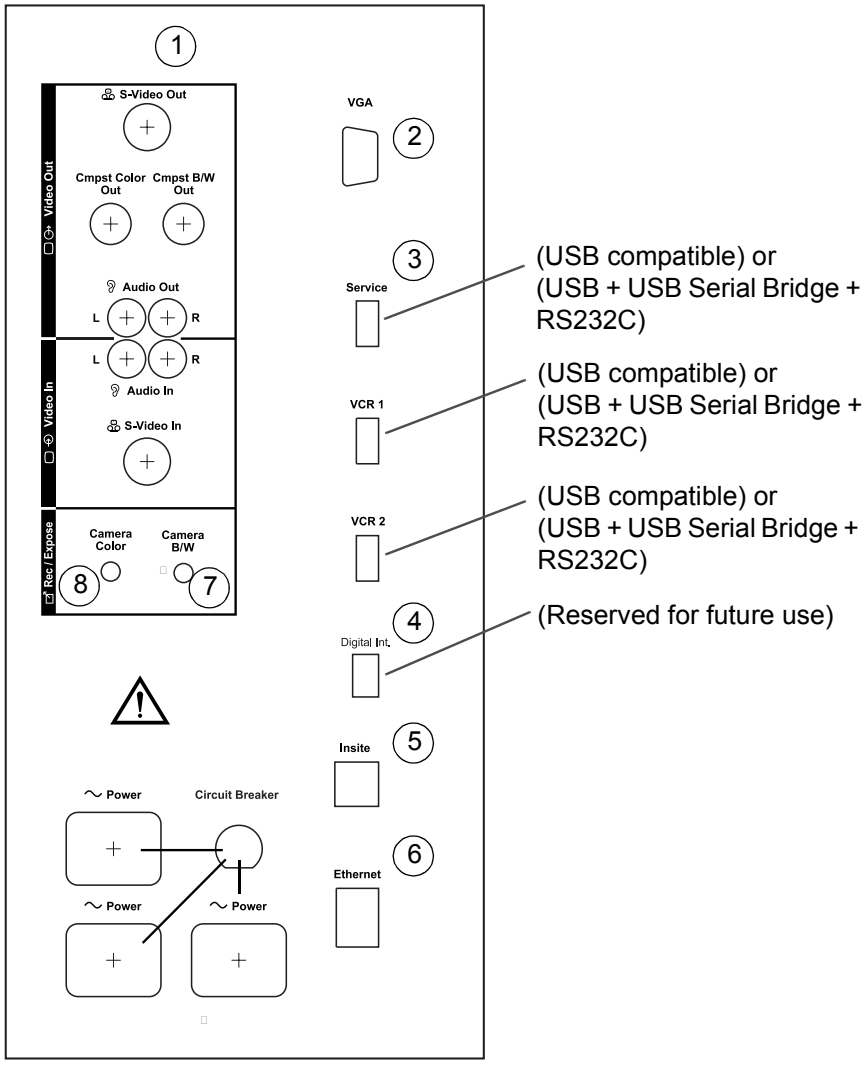
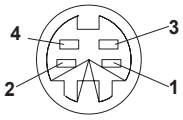


Figure 3-8 Rear Connector Panel

NOTE: Each outer (case) ground line of peripheral/accessory connectors are protectively grounded. Signal ground lines are not isolated, except the Service port (3). All of signal lines (include signal GND) of the Service port are isolated.
The specified peripherals/accessories only can be connected to the USB ports.

3-6-1-1 Rear Panel Connector (cont'd)

(1) Pin Assignment of S-Video Connector

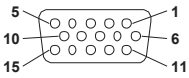


Connector: S-Terminal, 4-pin

Table 3-13 Pin Assignment of S-Video Connector

Pin No	Output/Input Signal	Description
1	SVIDEO OUT/IN YG	Y (Luma) GND
2	SVIDEO OUT/IN CG	C (Chroma) GND
3	SVIDEO OUT/IN Y	Y (Luma) SIGNAL
4	SVIDEO OUT/IN C	C (Chroma) SIGNAL

(2) Pin Assignment of VGA Connector

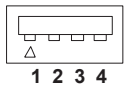


Connector: Shrank D-Sub, 15-pin

Table 3-14 Pin Assignment of VGA Connector

Pin No	Output Signal	Description
1	IO VGA OUT1 R	Red
2	IO VGA OUT1 G	Green
3	IO VGA OUT1 B	Blue
6	IO VGA OUT1 RG	Reg GND
7	IO VGA OUT1 GG	Green GND
8	IO VGA OUT1 BG	Blue GND
13	IO VGA OUT1 HS	H Sync
14	IO VGA OUT1 VS	V Sync
Others	GND	GND

(3) Pin Assignment of Service/VCR 1/VCR 2 Connector



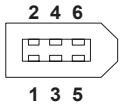
Connector: 4 pin

Table 3-15 Pin Assignment of Service/VCR 1/VCR 2 Connector

Pin No	Output Signal	Description
1	VBUSn	Power Supply
2	Dn	Data (-)
3	Dn	Data (+)
4	GNDn	Power Ground

3-6-1-1 Rear Panel Connector (cont'd)

④ Pin Assignment of Digital Int. Connector

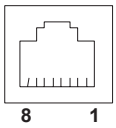


Connector: 6-pin

Table 3-16 Pin Assignment of IEEE-1394 Connector)

Pin No	Output Signal	Description
1	VP	1394 Power Supply
2	VG	1394 Power Ground
3	TPB	1394 Data B (-)
4	TPB	1394 Data B (+)
5	TPA	1394 Data A (-)
6	TPA	1394 Data A (+)

⑤ Pin Assignment of Ethernet

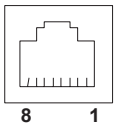


Connector: RJ-45 Modular, 8-pin

Table 3-17 Pin Assignment of Ethernet Connector

Pin No	Output Signal	Description
1	ETHER TD	Ethernet TD+
2	ETHER TD	Ethernet TD-
3	ETHER RD	Ethernet RD+
6	ETHER RD	Ethernet RD-
Others	NC	Non-connection

⑥ Pin Assignment of Insite



Connector: RJ-11 Modular, 6-pin

Table 3-18 Pin Assignment of Insite Connector

Pin No	Output Signal	Description
2	TEL L4	Telephone L4
3	TEL L2	Telephone L2
4	TEL L1	Telephone L1
5	TEL L3	Telephone L3
Others	NC	Non-connection

3-6-1-1 Rear Panel Connector (cont'd)

⑦ Pin Assignment for Camera B/W

Camera B/W

Table 3-19 Pin Assignment of Mini-Jack for Controlling B/W Camera

Pin No	Output Signal
1	PRINT
2	Signal GND

NOTE: Output level of control signals indicated in the above tables are TTL level.

⑧ Pin Assignment of Insite

Camera Color

Table 3-20 Pin Assignment of Mini-Jack for Controlling Color Camera

Pin No	Output Signal
1	SHUTTER
2	Signal GND

3-6-1-2 Front Connector Panel

Located on the front panel are Microphone, LED, and Reset.

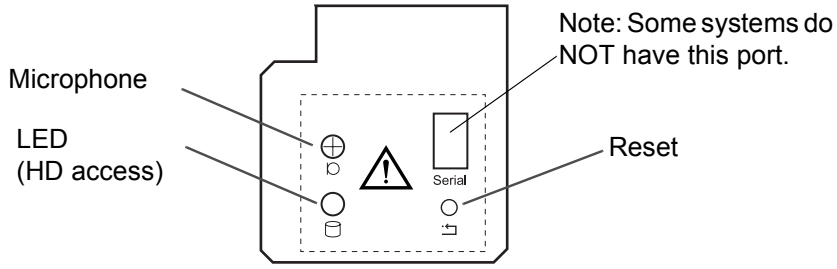


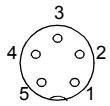
Figure 3-9 Front Connector Panel

3-6-1-3 B/W Printer Connector Panel

Table 3-21 Pin Assignment of Mini-Jack for Controlling B/W Printer

Pin No	Output Signal
1	PRINT
2	Signal GND

3-6-1-4 Footswitch Connector Panel



Round 5 pin connector.

Table 3-22 Pin Assignment of Mini-Jack for Footswitch

Pin No	Output Signal
1	SW1-WH
2	SW2-RD
3	SW3-GN
4	SW1-BK, SW2-BK, SW3-BK
5	Frame GND

NOTE: Output level of control signals indicated in the above tables are TTL level.

Chapter 4
Functional Checks

Section 4-1
Overview

4-1-1 Purpose for Chapter 4

This chapter provides procedures for quickly checking major functions of the LOGIQ™ 7 console, diagnostics by using the built-in service software, and power supply adjustments.

Table 4-23 Contents in chapter 4

NOTICE Most of the information pertaining to this Functional Checks chapter is found in the LOGIQ™ 7 Quick Guide (Direction Number 2291859-100).
Look for the letters (QG) after a section in the Table of Contents to determine if the information is in this chapter or in the Quick Guide.

4-1-2 Required Equipment

- An empty (blank) MO Disk.
- At least one transducer. See “Probes” on page 23 for an overview.
  (normally you should check all the transducers used on the system.)

Section 4-2
General Procedure

CAUTION **SYSTEM REQUIRES ALL COVERS**
Operate this unit only when all board covers and frame panels are securely in place. The covers are required for safe operation, good system performance and cooling purposes.

4-2-1 Power On/Boot Up

NOTE: After turning off the system, wait at least ten seconds before turning it on again. The system may not be able to boot if power is recycled too quickly.

4-2-1-1 Power Up

1.) Connect the Main Power Cable at the rear of the System.

WARNING ***Protective earth must be taken when connecting AC power cable (200V) without its plug to wall outlet.***

2.) Connect the Main Power cable to an appropriate mains power outlet.

3.) Switch ON the Main Circuit Breaker at the rear of the System.

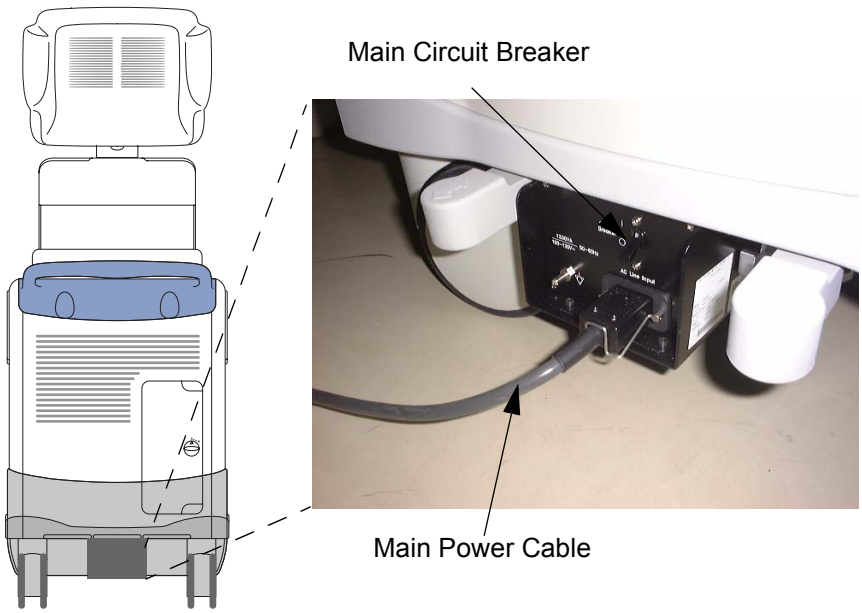


Figure 4-1 Circuit Breaker

When power is applied to the Scanner, and the Rear Circuit breaker is turned ON, Power is distributed to the Fans, Control panel, Monitor, Internal and External I/O's, Cage Boards, Peripherals and the Backend Processor. When the Power ON/OFF key is pressed once, the Backend Processor starts and its software code is distributed to initiate the scanner.

4.) Press the **ON/OFF** key at the front of the System once.

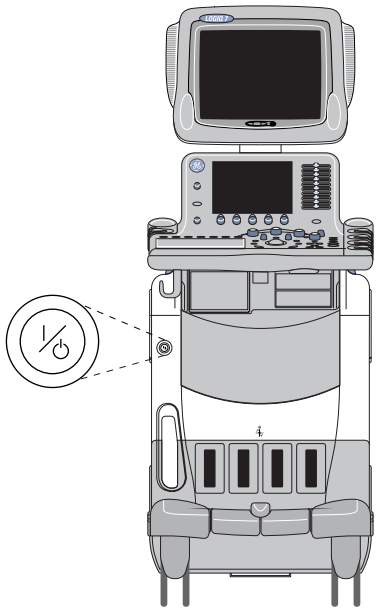


Figure 4-2 Power On/Off Standby Switch Location

4-2-1-2 Power Up Sequence (R.1.0.3 or later)

1.) The Start Up Screen will be shown on the Monitor display when the system is turned ON.

Figure 4-3

2.) After initialization is complete, all lighted buttons on the Control Panel light and the default B-Mode screen or Patient screen (no probes are connected) is displayed on the monitor display.

4-2-1-3 Power Up Sequence (R.1.0.3 or later)

1.) Insert the service dongle in the Service port located at the rear panel.
2.) The Start Up Screen will be shown on the Monitor display when the system is turned ON.
3.) Then Start Loader display will be shown on the Monitor display. Then the scanner is booted up automatically.

NOTE: To enter the Maintenance Mode, select Maintenance button.

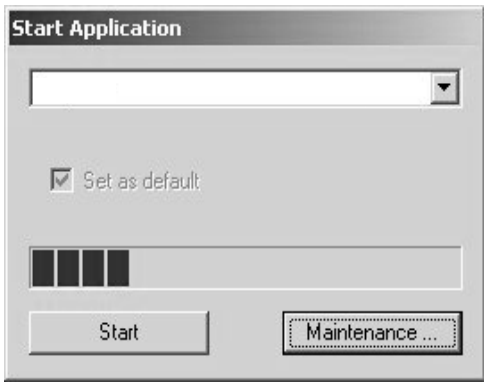


Figure 4-4 Start Application Window

NOTE: Start is selected automatically when it time out.

4-2-1-4 Power Up Sequence (R.1.0.3 or before)

1.) The Login Dialog Box will be shown on the Monitor display when the system is turned ON.
2.) Enter the user name “pegasus”, and the password “hope01”.

Figure 4-5 Login Dialog Box

3.) Press OK button. Then the remaining installation process will start, and new software will be started automatically after the logging in procedure.
4.) Wait for the system is properly running.

4-2-2 System Restart/Shutdown

Purpose: This is a description on how to Reset and Shutdown the system.

4-2-2-1 Restarting System

1.) When the scanner hangs up, the following Reset button must be pressed to resume the system, using a pencil.

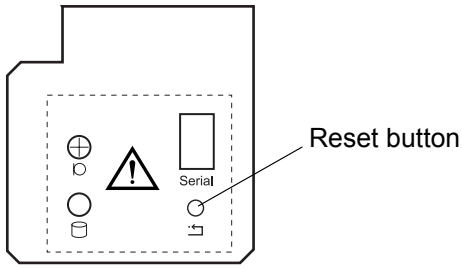


Figure 4-6 Location of Reset button on Front Panel

4-2-2-2 Power Shutdown

1.) Press the **ON/OFF** key at the front of the System for about two (2) seconds. Refer to Figure 4-2 on page 4-3.
2.) Switch OFF the Main Circuit Breaker at the rear of the system Refer to Figure 4-1 on page 4-2.
3.) Disconnect the Main Power Cable if needed. Refer to Figure 4-1 on page 4-2.

4-2-3 Using CD-R/MOD Drive

4-2-3-1 Using CD-R Drive

⚠ **NOTICE** **Never move the unit with a disk in the CD-R because the drive actuator will not be locked and the CD-R could break.**

1.) Push the **EJECT** button, the disk tray will appear.
2.) Put the disk onto the disk tray.
3.) Press the **EJECT** button to insert the disk into the CD-R device.
4.) There are a number of methods to eject a disk from the CD-R. Ejection is automatic in some cases. Manual ejection methods, listed in preferred order of use, are:
   a.) Press **EJECT** button on the CD-R while system is ON.
   b.) Press and hold **EJECT** button while the system is booting.
   c.) Mechanical ejection. Insert the end of a paper clip into the hole while system power is OFF.

⚠ **NOTICE** **Avoid mechanical ejection whenever possible. Mechanical ejection leaves the actuator unlocked and the MOD susceptible to damage if moved. If forced to use this method, reboot the system, then insert and eject a known good disk using one of the other methods.**

Figure 4-7 CD-R drive

NOTE: Be careful not to scratch the disk when wiping it off for cleaning.

NOTE: Keeping your CD-R disc in an original CD-R case or caddy all the time will prevent it from becoming dirty or damaged.

4-2-3-2 Using MOD Drive

1.) Before installing an MO disk in the MOD, check the MO disk for loose hardware or damaged labels which could jam inside the MO Drive. Also ensure that the slide switch in one corner of the disk is set so that the disk is write enabled (disk hole closed).

2.) Insert the disk into the MOD with the label facing up.

NOTICE **Never move the unit with a disk in the MOD because the drive actuator will not be locked and the MOD could break.**

3.) The are a number of methods to eject a disk from the MOD. Ejection is automatic in some cases. Manual ejection methods, listed in preferred order of use, are:

a.) Press **EJECT** button on the MOD while system is ON.

b.) Press and hold **EJECT** button while the system is booting.

c.) Mechanical eject. Insert the end of a paper clip into the hole while system power is OFF.

NOTICE **Avoid mechanical ejection whenever possible. Mechanical ejection leaves the actuator unlocked and the MOD susceptible to damage if moved. If forced to use this method, reboot the system, then insert and eject a known good disk using one of the other methods.**

Figure 4-8 MOD drive

4-2-4 Archiving and Loading Presets

NOTE: Always save presets before any software reload. This ensures the presets loaded after the software reload are as up–to–date as possible.

All user presets except changes to Summary, Anatomy, and Biometry pages, can be saved on an CD-R/MOD disk for reloading on the system.

NOTICE Presets should NOT be saved on the same CD-R/MO disk as images. The Archive Menu lists the images but does NOT list the presets stored on a CD-R/MO disk.

4-2-4-1 Formatting CD-R/MO Disk

1.) Insert an empty (blank) CD-R/MO disk into the CD-R/MOD device.

2.) Access to the **Utility** Menu on the Touch Panel, and select **Connectivity>Tools**. The Tools screen will be shown on the monitor.

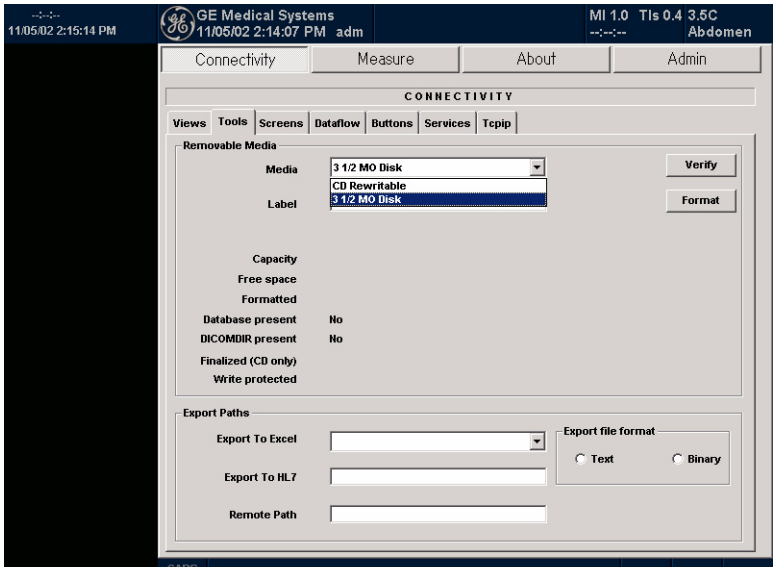


Figure 4-9 Formatting Removable Media1

3.) Select the removable media from media list.

4.) Type a name for the removable media in Label field.

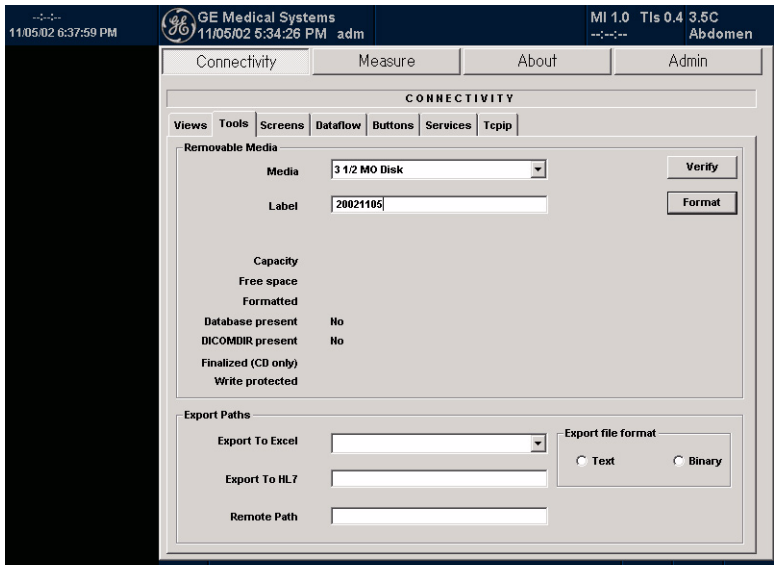


Figure 4-10 Formatting Removable Media2

5.) Select Format button.

4-2-4-2 Archiving Presets to an CD-R/MO Disk

1.) Insert an empty (blank) formatted CD-R/MO disk into the CD-R/MOD device.

2.) Access to the **Utility** Menu on the Touch Panel, and select **System**>**Backup/Restore**. The Backup screen will be shown on the monitor.

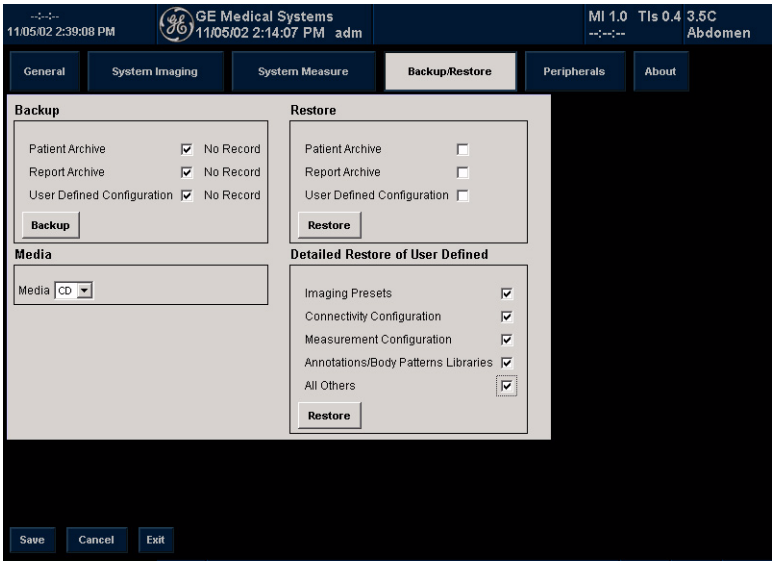


Figure 4-11 Backup Sheet

3.) Select the item to back up either from Resource Files.

4.) Select the media to locate the items.

5.) Click on **Backup**. The backup status for each item is displayed on the Result column.

6.) Make sure “Finished OK” is displayed on the Result column.

4-2-4-3 Loading Presets from an CD-R/MO disk

1.) Insert the CD-R/MO disk with the archived Presets into the CD-R/MOD.

2.) Access to the **Utility** Menu on the Touch Panel, and select **System**>**Backup/Restore**. The Restore sheet will be shown on the monitor.

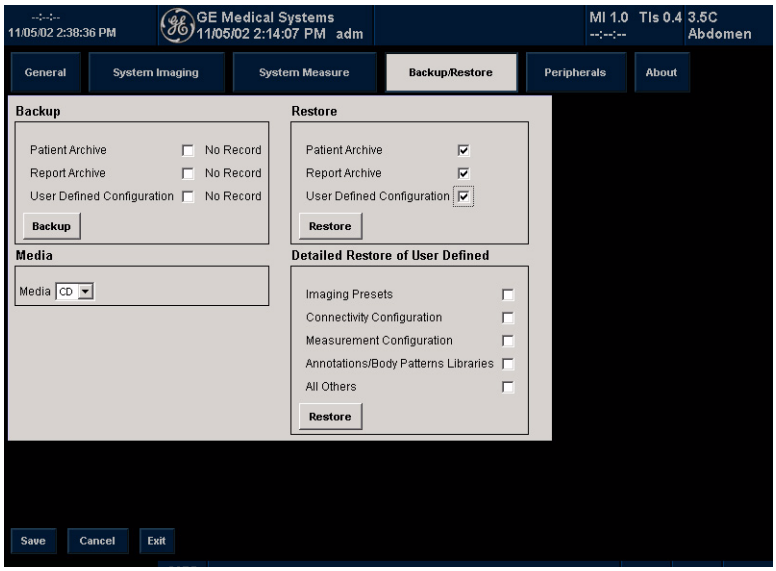


Figure 4-12 Restore Sheet

3.) Select the item to restore either from resource Files.

4.) Click on **Restore**. A message to make sure the restore process is displayed on the monitor. Click **OK**. The restore status for each item is displayed on the Result column.

5.) Make sure “Finished OK” is displayed on the Result column.

4-2-5 Lockout/Tagout Requirements

Follow OSHA Lockout/Tagout requirements by ensuring you are in total control of the plug.

Section 4-3
Functional Checks

4-3-1 System Features (QG)

For an overview of the system's features, including the **Control Panel**, **Touch Panel**, and **Monitor**, refer to the LOGIQ™ 7 Quick Guide.

4-3-2 System Mode Checks (QG)

For a functional check of the system's different modes, refer to the LOGIQ™ 7 Quick Guide. The Quick Guide will familiarize you with image optimization for **B-Mode**, **M-Mode**, **Color Flow**, and **Doppler**.

4-3-3 Basic Measurements (QG)

Basic Measurements for the LOGIQ™ 7 include **Distance and Tissue Depth**, **Circumference/Area (Ellipse and Trace)**, **Volume**, **Time Interval**, **Velocity**, **PI**, **RI**, **S/D Ratio**, **D/S Ratio**, and **A/B Ratio**. Information for all these tests is found in the LOGIQ™ 7 Quick Guide.

4-3-4 Probe/Connectors Usage (QG)

The LOGIQ™ 7 Quick Guide, provides information on connecting, activating, deactivating and disconnecting probes.

4-3-5 Using Cine (QG)

For activating Cine, creating and storing Cine Loops, and information on the Cine Timeline, refer to the LOGIQ™ 7 Quick Guide.

4-3-6 Image Management (QG)

This section in the LOGIQ™ 7 Quick Guide talks about several topics:

- Clipboard
- Printing Images
- Browsing and Managing an Exam's Stored Image
- Connectivity, Dataflow Concept and Creation
- Starting an Exam
- Configuring Connectivity
- TCP/IP
- Services (Destination)
- Buttons
- Views
- Verifying and Printing a Device

4-3-7 ECG Checks

Connect the ECG Harness and check:

Table 4-24 ECG Control

Step	Task	Expected Result(s)
1	Connect the ECG at the Connector on the Front of the system	It will display a curve along the bottom edge of the image sector

4-3-8 Backend Processor Checks

- If all the previous tests have been passed successfully, the backend processor is most likely OK.
- If the system seems to be operating erratically, please refer to Chapter 7, Diagnostic/ Troubleshooting.

Section 4-4
Software Configuration Checks

Refer to Chapter 3, Section 3-5 - System Configuration for setting procedures.

Table 4-25 Software Configuration Checks

Step	Task to do	Expected Result(s)
1.	Check Date and Time setting	Date and Time are correct
2.	Check that Location (Hospital Name and Department) is correct	Location Name is correct
3.	Check Language setting	Language is proper
4.	Check Units setting	Units are proper

Section 4-5
Keyboard and Display Platform Console Check

Table 4-26 Display platform Maneuverability check

Step	Task to do	Expected Result(s)
1.	Pull release lever under the OP Panel to release the lock.	The height of the Monitor and OP Panel will be maneuverable.

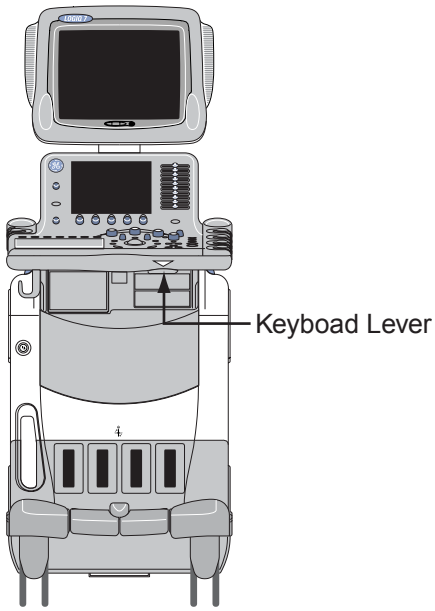


Figure 4-13 Keyboard Lever

Section 4-6
Peripheral Checks

Check that peripherals work as described below:

Table 4-27 Peripheral checks

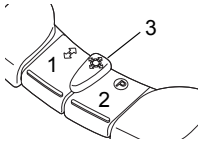
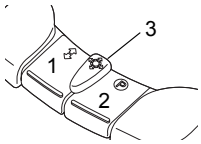
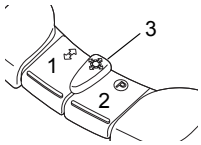
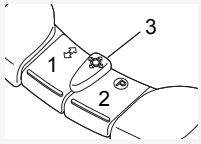
Step	Task to do	Expected Result(s)
1.	Press Freeze	Stop image acquisition.
2.	Press (P1) or (P4) on the Control panel	The image displayed on the screen is printed on B&W or Color printer and (TBD) depending on the key assignment configuration.

Section 4-7
Safety issues

4-7-1 Brakes and Direction Locks Checks

Check that: brakes and direction locks function as described below. Refer to Figure 4-14 for the locations of brake and swivel.

Table 4-28 Brakes and Direction Lock Check

Step	Task to do	Expected Result(s)
1.	Press on pedal no.2 	To engage the pedal in full lock
2.	Press on pedal no.3 	To release the brake
3.	Press on pedal no.1 	To engage swivel lock
4.	Press on pedal no.3 	To release swivel lock

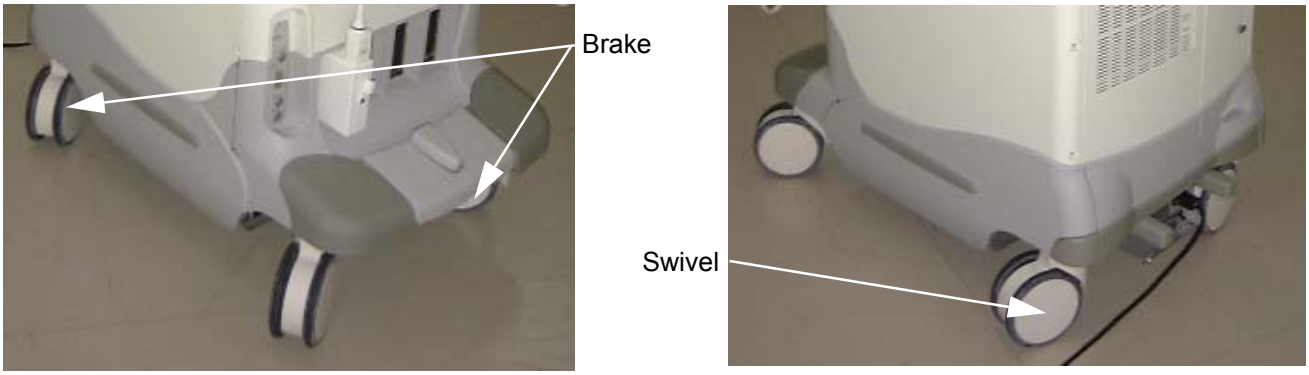


Figure 4-14 Brake and Swivel Location

Chapter 5
Components and Functions (Theory)

Section 5-1
Overview

This chapter explains LOGIQ™ 7's system concepts, component arrangement, and subsystem function. It also describes the Power Distribution System (PDS) and probes.

Table 5-14 Contents in Chapter 5

Section 5-2
Block Diagrams and Theory

5-2-1 Block Diagram

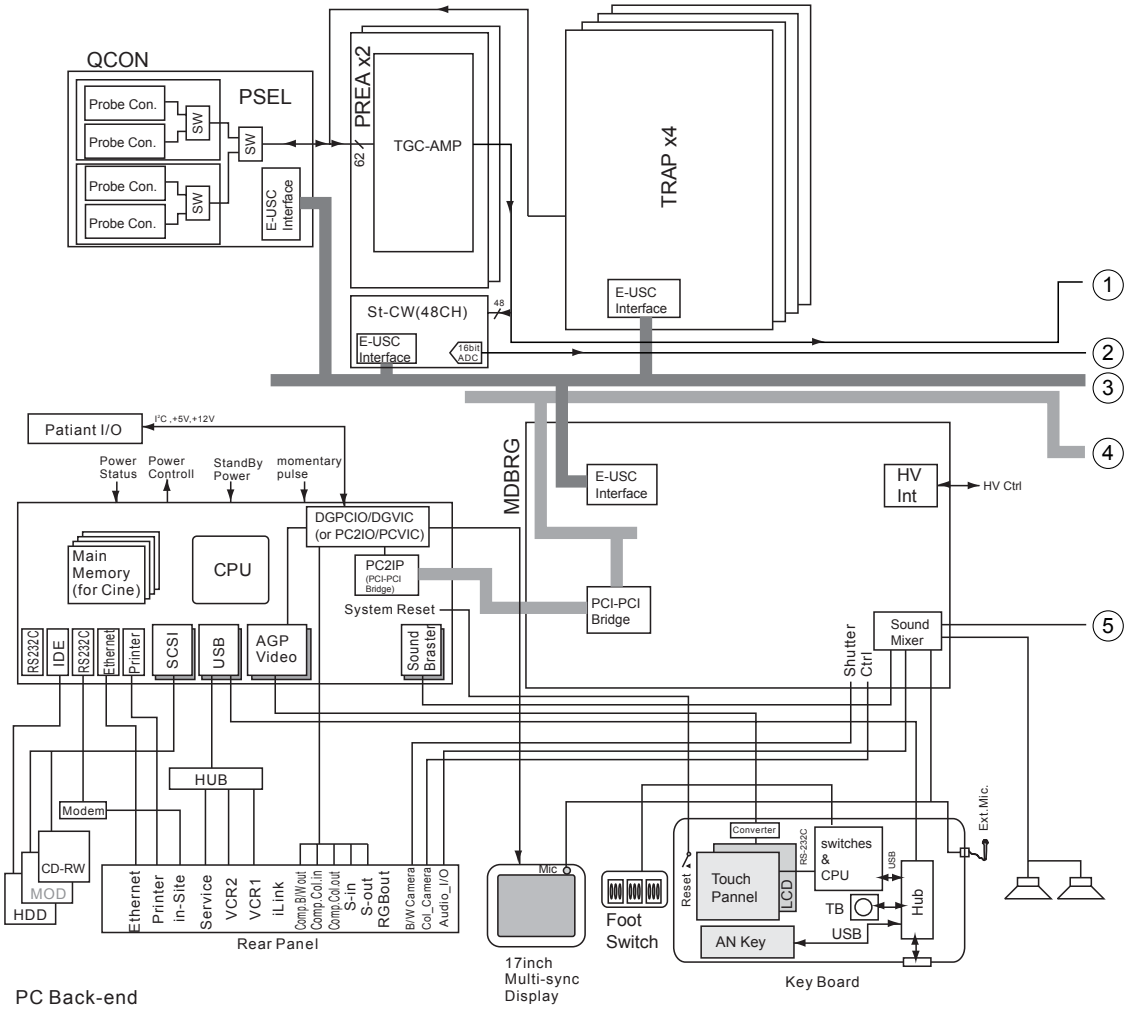


Figure 5-5 LOGIQ™ 7 System Block Diagram

5-2-1 Block Diagram (cont'd)

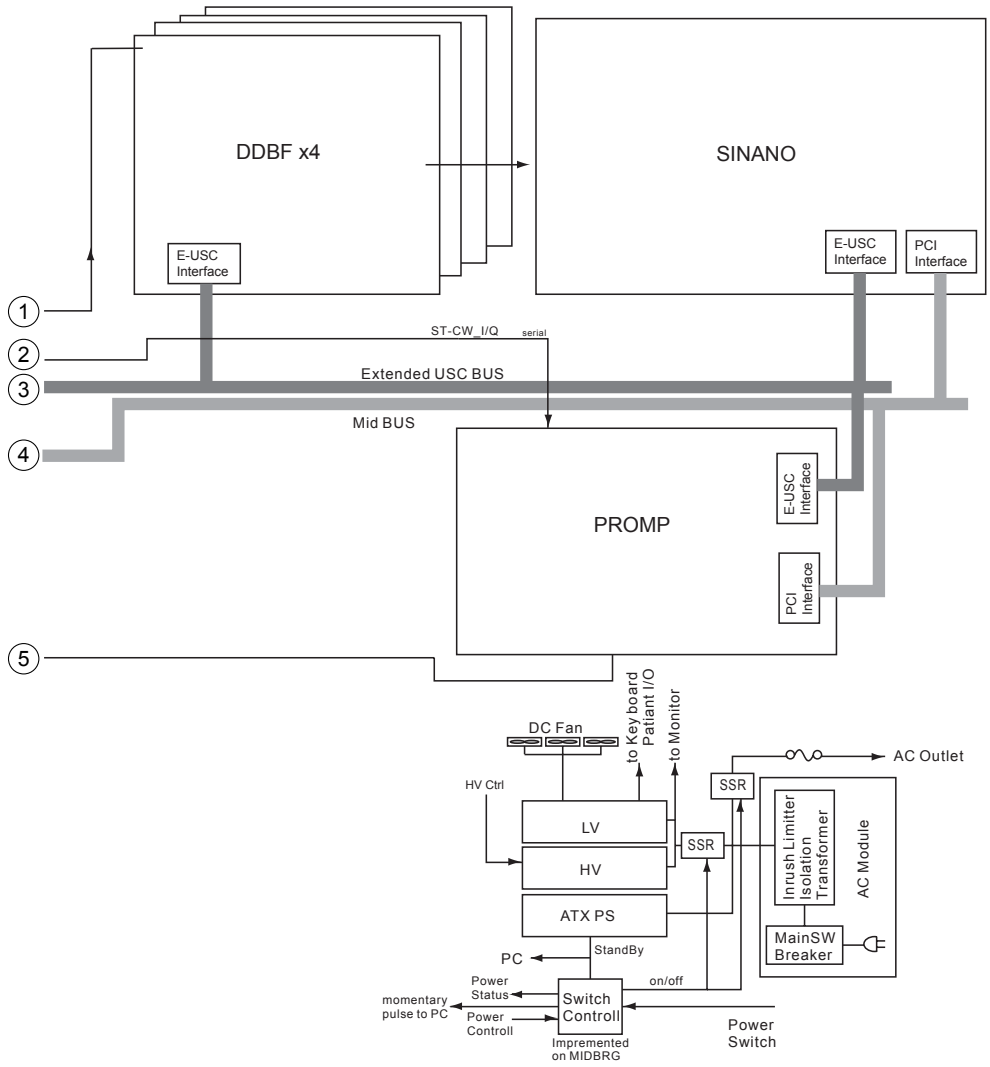


Figure 5-6 LOGIQ™ 7 System Block Diagram

5-2-2 General Information

- LOGIQ™ 7 is a phased and linear array ultrasound imaging scanner. It has provisions for analog input sources like ECG and phono. A dedicated Doppler probe may also be connected and used.
- The system can be used for:
  - 2D Black and White imaging
  - 2D Color Flow
  - M-Mode Black and White imaging
  - Color M-Mode
  - Doppler
  - a number of combinations of the above
- LOGIQ™ 7 is a digital beam forming system that can handle up to 192 element linear probes through multiplexing.
- Signal flow from the Probe Connector Panel to the Front End, to the Mid Processors and Back End Processor and finally to the monitor and peripherals.
- System configuration is stored on a hard disk and all necessary software is loaded from the hard disk on power up.

5-2-3 Front End

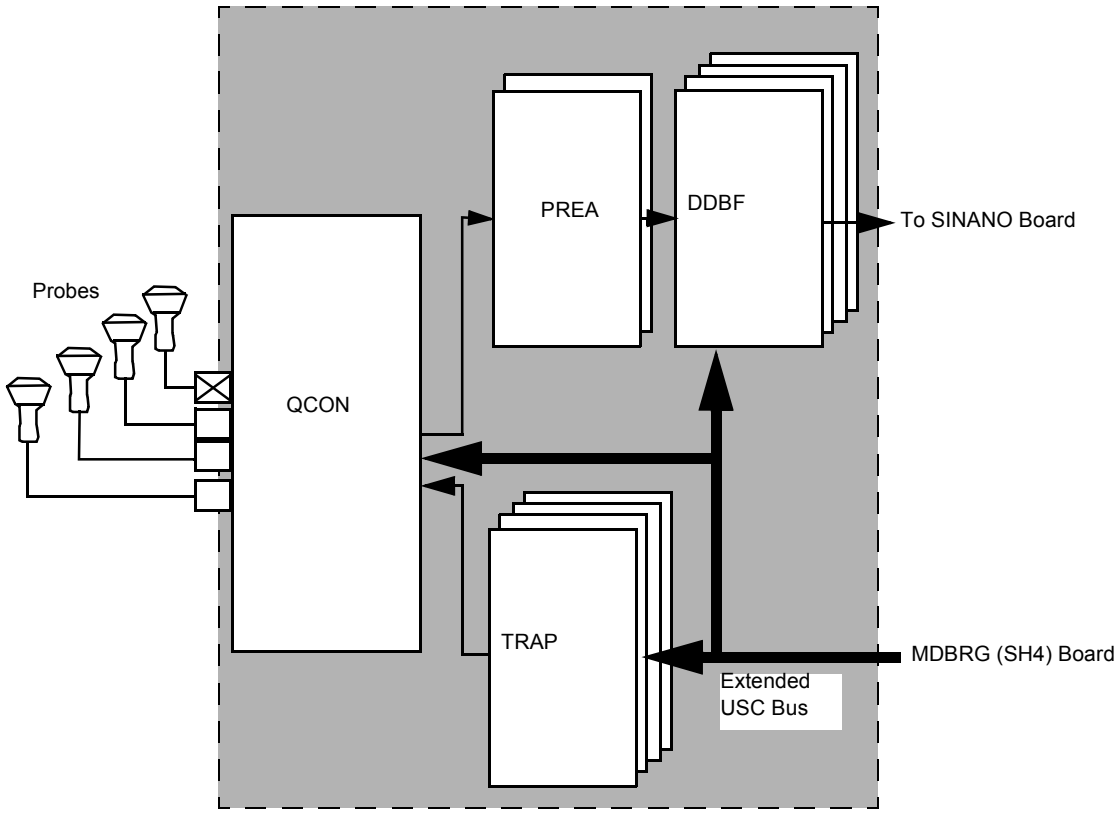


Figure 5-7 The Front End

The Front End generates the pulses transmitted by the probes as ultrasound into the body. It also receives weak ultrasound echoes from blood cells and body structure, amplifies these signals and converts them to an digital signal.

The digital representation of this signal is presented to the Mid Processor section.

- PREA (Preamplifier): The two preamplifiers amplify 64 echo signals, totally 128 echo signals. The reception signals are sent to DDBF.
- DDBF: Cascading four receiving beam formers (four DDBFs) allows the system to achieve 128ch delay summing.
- TRAP (Transmitted Pulse Generator): This transmitter has 32 channel bipolar drivers, delay calculators, and 16Mbit x 4 flash memories.

5-2-4 Mid Processors

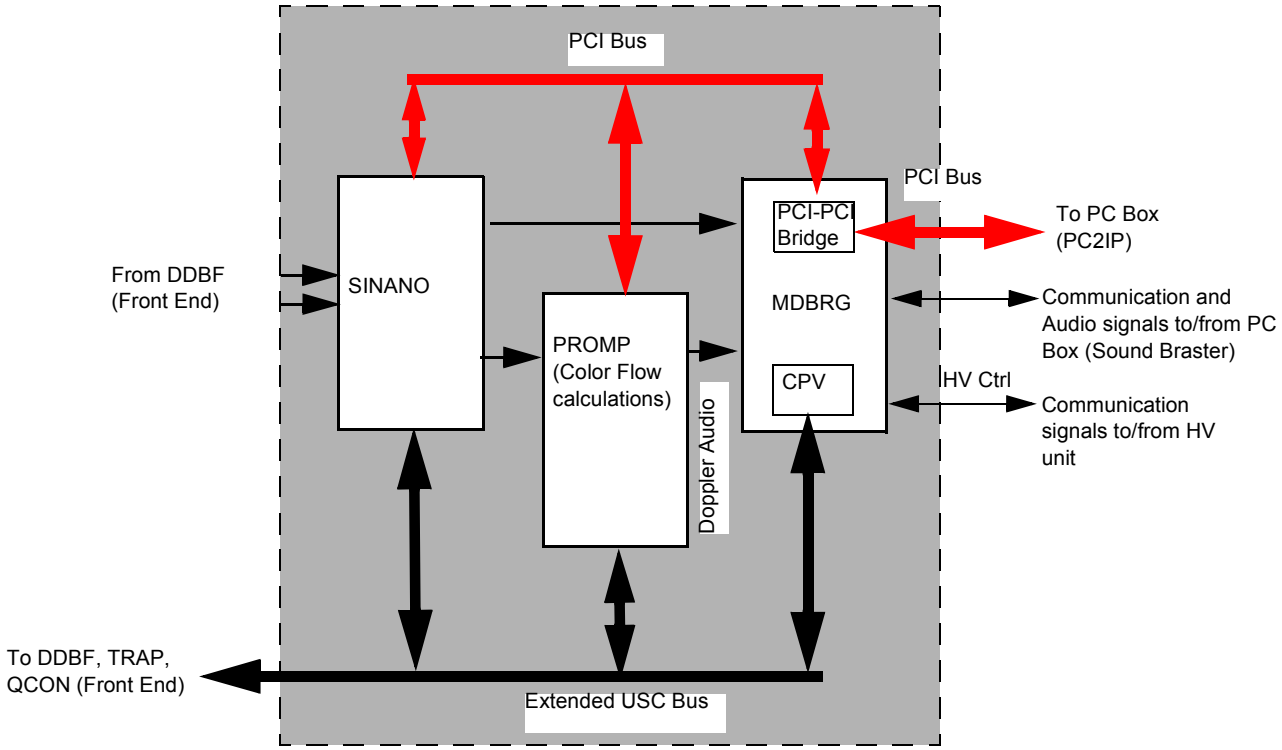


Figure 5-8 The Mid Processors

This block performs the adequate signal conditioning for Tissue and Doppler. Color Flow processing is done by the PROMP board.

- SINANO: Processes each echo signals by frame averaging for B-mode, peak detection for M-mode, FFT and LOG compression for all doppler-modes, and envelope detection.
- MDBRG: This board is one of Mid processor board, and contains main functions of real time controller, PCI-PCI bridge, Image data transferring, and peripheral control.
- PROMP: This board is also doing the Pulse Doppler Color Flow Processing.

5-2-5 CPU/Back End Processor

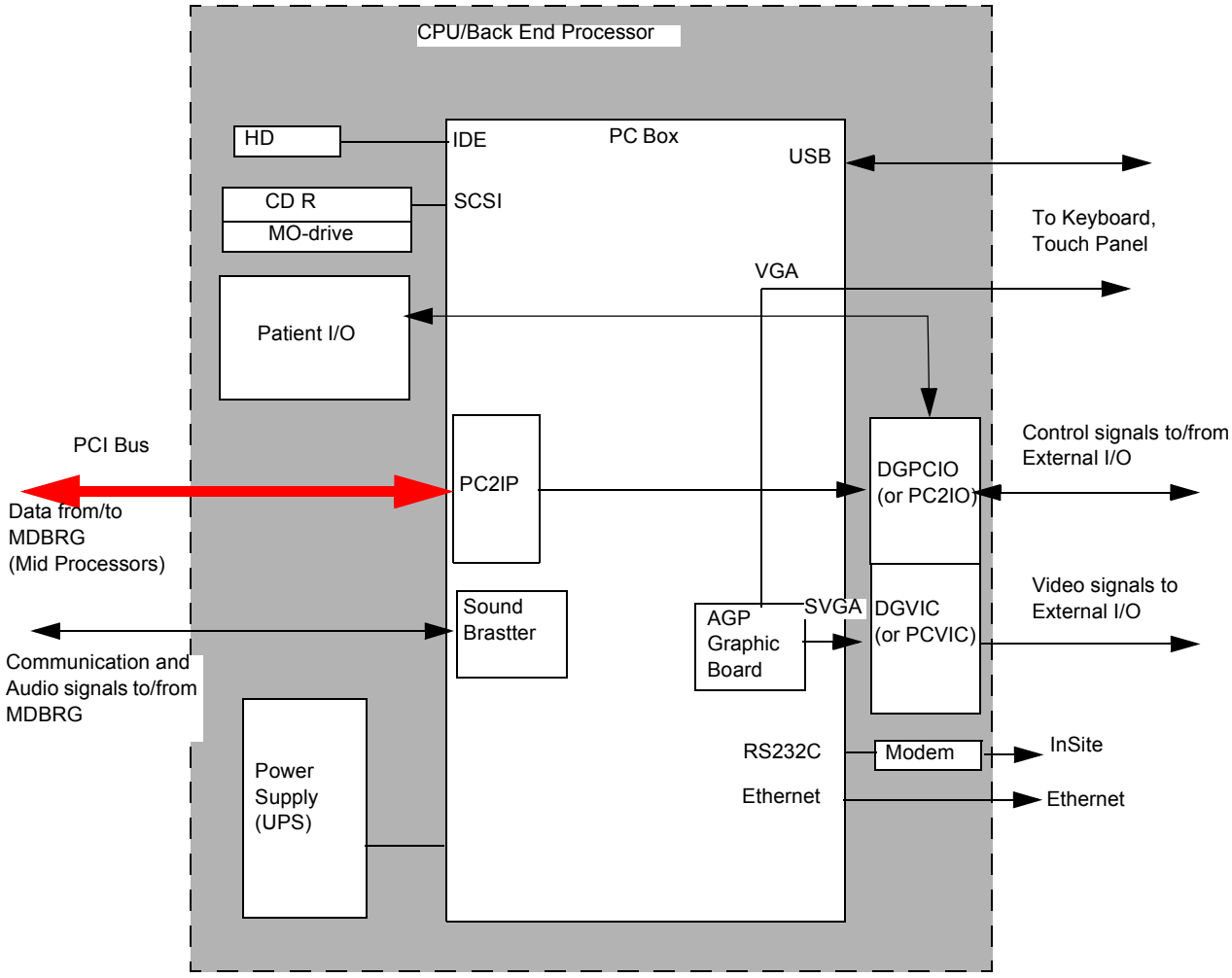


Figure 5-9 CPU/Backend Processor

The Back End Processor grabs the data from the Image Port, stores it in a memory, performs scan conversion to pixel domain and drives the system RGB monitor.

Storing Devices:

- Hard Disk Drive (HD Drive) (Outside the PC box)
- CD R Drive (Available from front of scanner).
- Optional Magneto Optical Drive (MO Drive) (Available from front of scanner).

5-2-6 Patient I/O (Option)

The optional Patient I/O is mounted at the front of the scanner with its connector panel.

Available inputs:

- PCG
- ECG
- AUX1
- AUX2

5-2-7 Top Console

The Top Console includes a Stand By/On switch, a keyboard, different controls for manipulating the picture quality, controls for use in Measure & Analyze (M&A), and loudspeakers for stereo sound output (used during Doppler scanning, inside the CRT monitor cover).

5-2-8 External I/O (Rear Panel)

The External I/O is the interface between the scanner and all external items, located at the rear side of the scanner.

Examples: InSite, TCP/IP network, Printer, etc.

5-2-9 Peripherals

A VCR, a Black & White Video Printer and a Color Printer may be installed onboard the scanner. These devices are connected to the External I/O (Rear Panel).

5-2-10 Interconnect Cabling

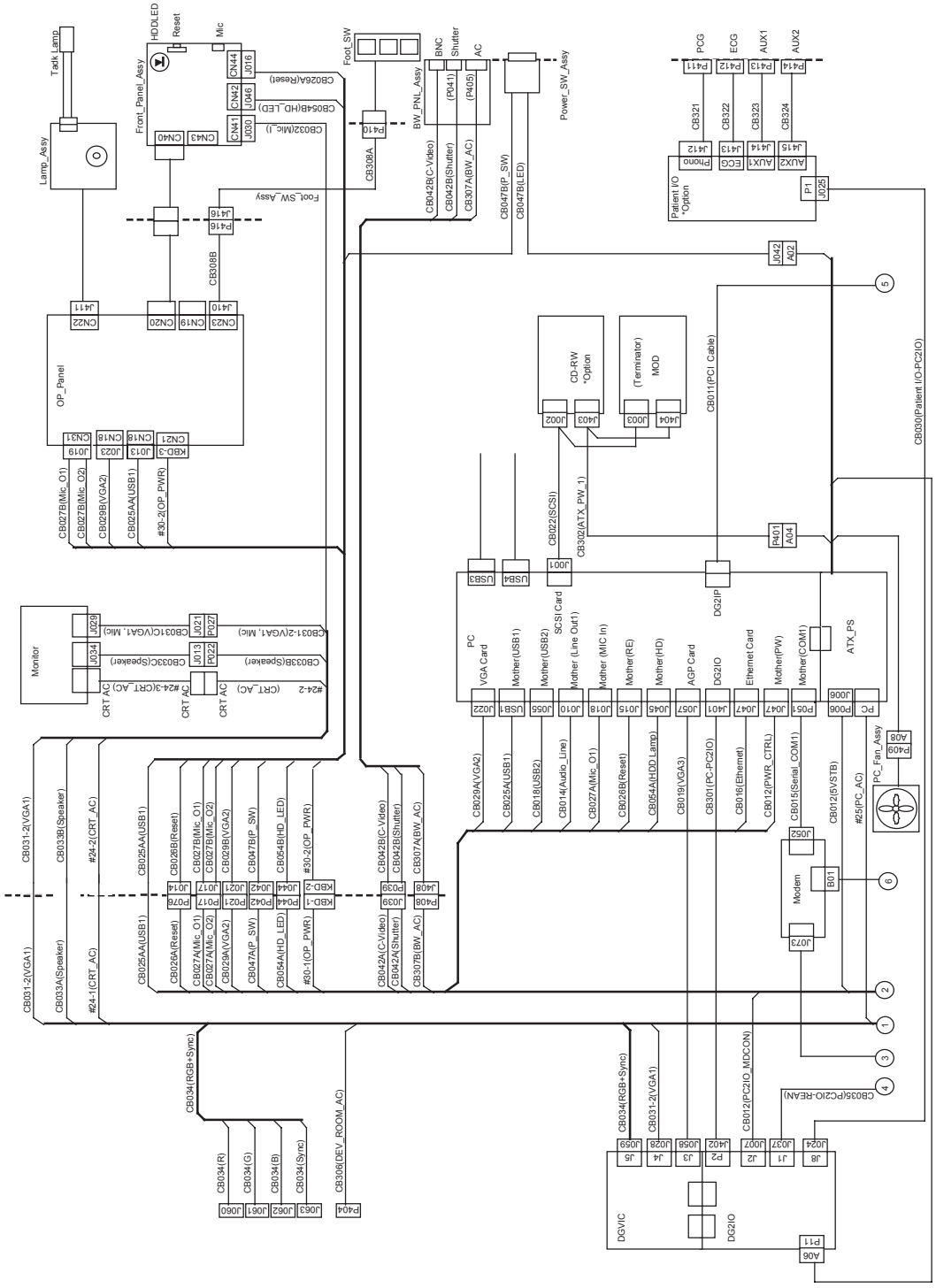


Figure 5-10 Cable Interconnect Diagram -Signal 1

5-2-10 Interconnect Cabling (cont'd)

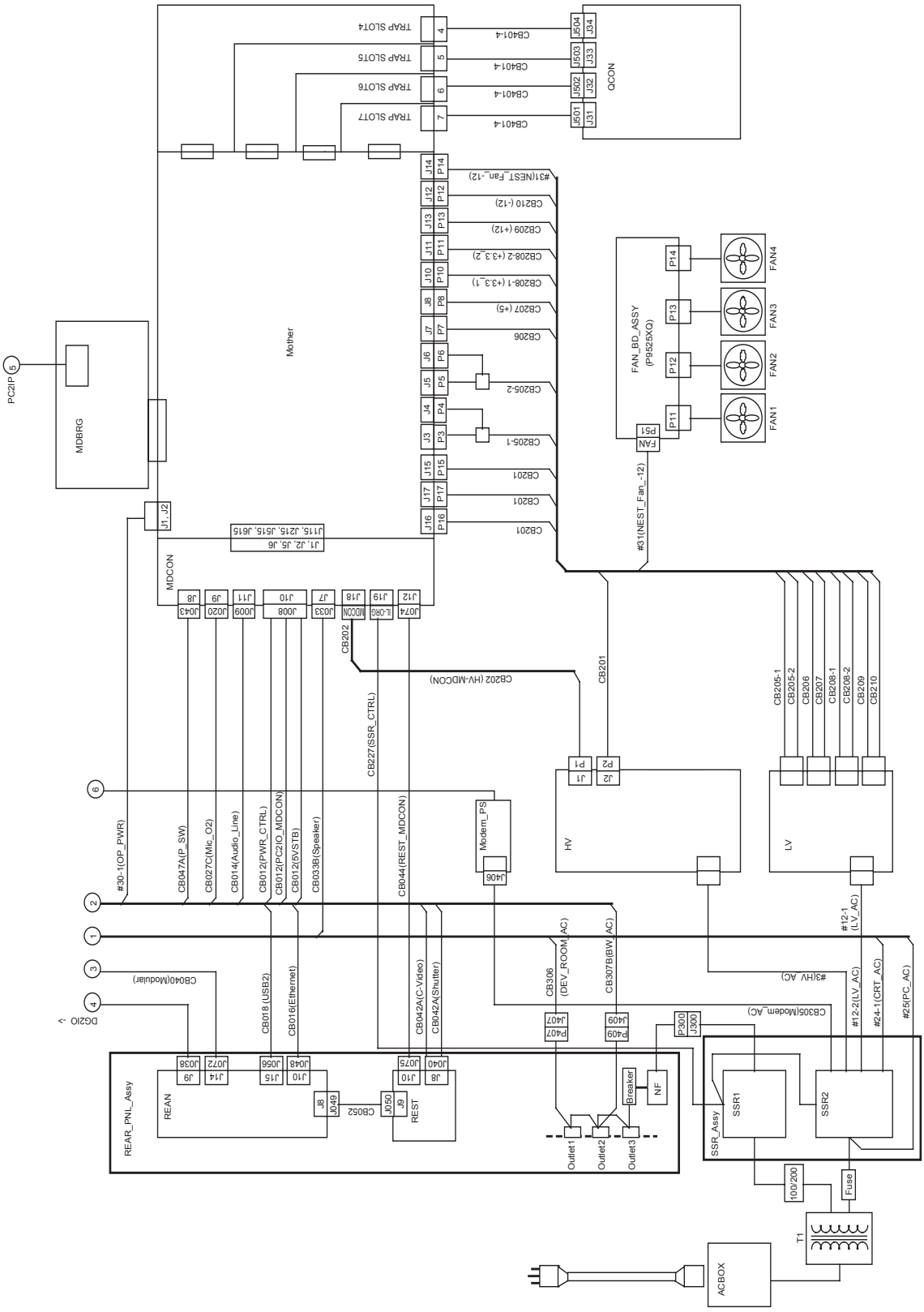


Figure 5-11 Cable Interconnect Diagram -Signal 2

5-2-10 Interconnect Cabling (cont'd)

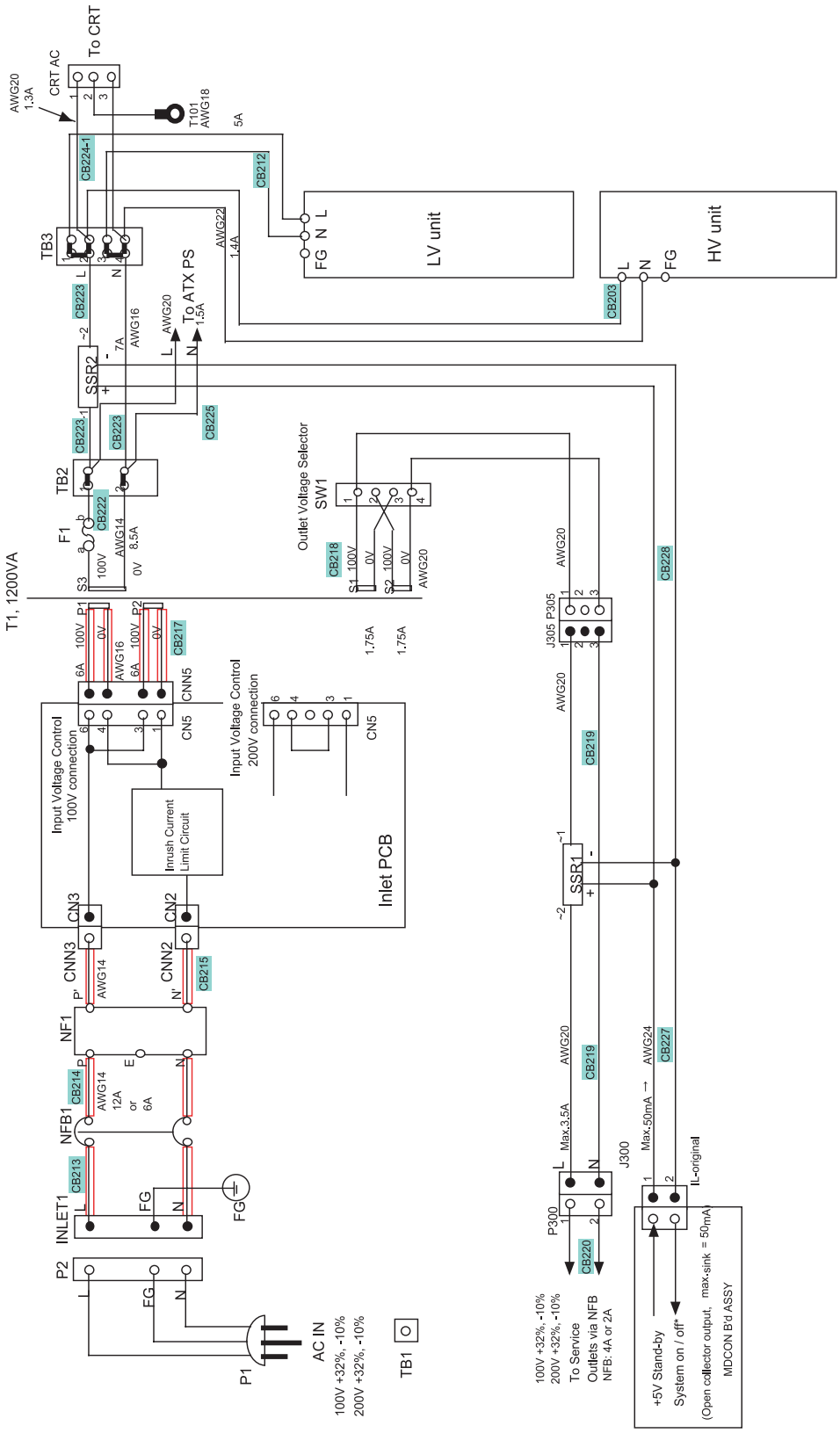


Figure 5-12 Cable Interconnect Diagram -Power 1

5-2-10 Interconnect Cabling (cont'd)

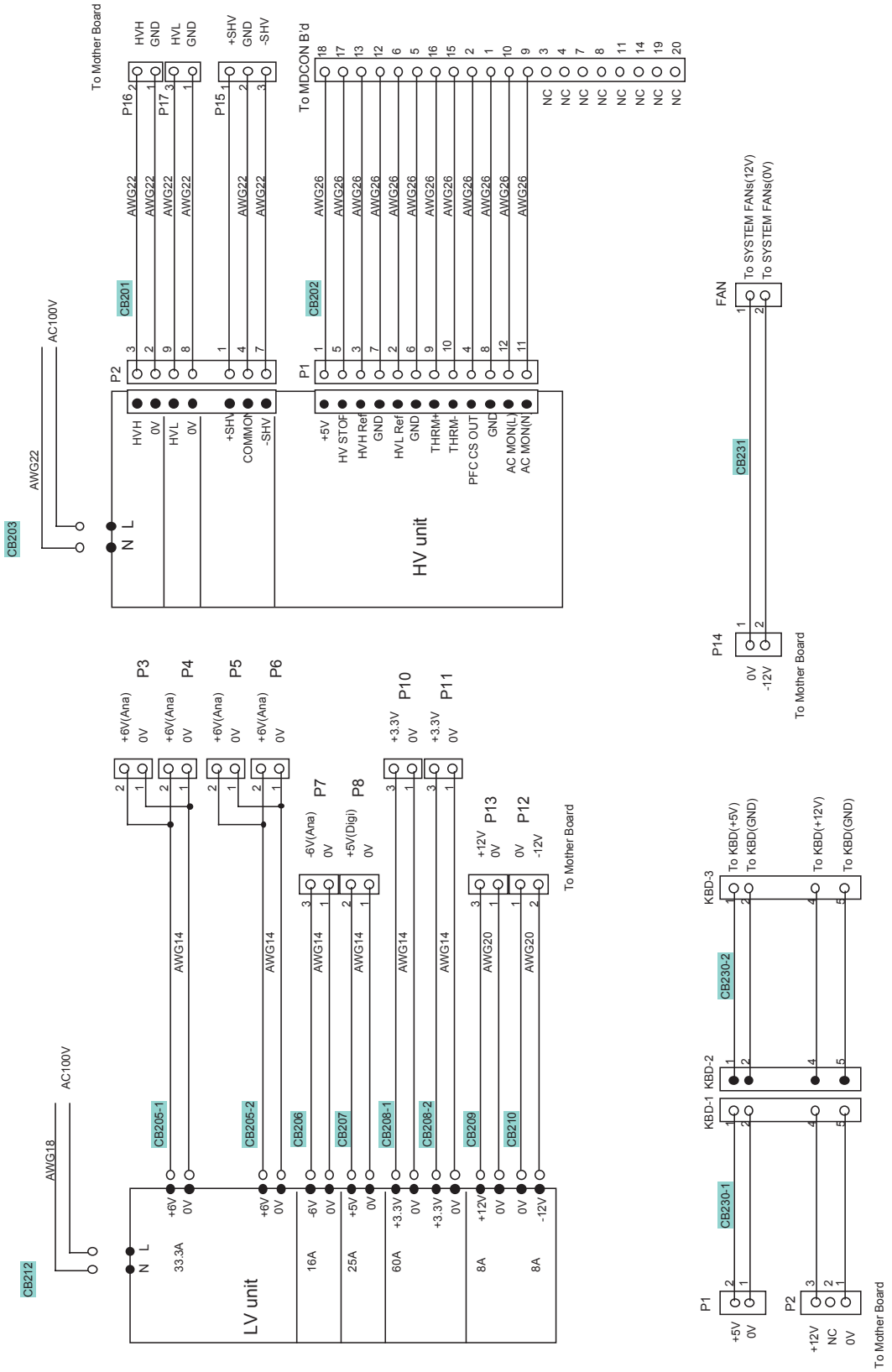


Figure 5-13 Cable Interconnect Diagram -Power 2

Section 5-3
Common Service Platform

5-3-1 Introduction

The Service Platform contains a set of software modules that are common to all PC backend ultrasound and cardiology systems. This web-enabled technology provides linkage to e-Services, e-Commerce, and the iCenter, making GE's scanners more e-enabled than ever. The Common Service Platform will increase service productivity and reduce training and service costs.

5-3-2 *iLinq* Interactive Platform Features

Many of the services of the Common Service Platform come from its integration with *iLinq*. The following sections contain a brief introduction of *iLinq's* features. Detailed information can be found in the LOGIQ™ 7 User Manual. (Direction 2286866-100.)

5-3-2-1 Web Server/Browser

The Service platform and other Service software use the *iLinq* web server and browser.

5-3-2-2 Connectivity

This feature provides basic connectivity between the scanner and the OnLine Center (OLC).

5-3-2-3 Configuration

This feature provides the interfaces to configure various *iLinq* parameters.

5-3-2-4 Contact GE

Allows a one-button touch for the user to contact the OnLine Center and describe problems with their scanner in an easy and convenient way.

5-3-2-5 Interactive Application

The main application is displayed in the form of HTML pages whenever the browser starts. This is the entry point for any user to start any *iLinq* application.

5-3-3 Global Service User Interface (GSUI)

GSUI is the pattern for the user interface. This interface standard will be followed by all modalities to achieve a common look-and-feel for service software across all GEMS products.

5-3-3-1 Internationalization

The user interfaces provided by the service platform are designed for GE personnel and as such are in English only. At this time there is no multi-lingual capability built into the Common Service Interface.

5-3-3-2 Service Login

Click on the button with the wrench icon  in the status bar at the bottom of the scanner console. This button links the user or the Field Engineer (FE) to the service login screen.

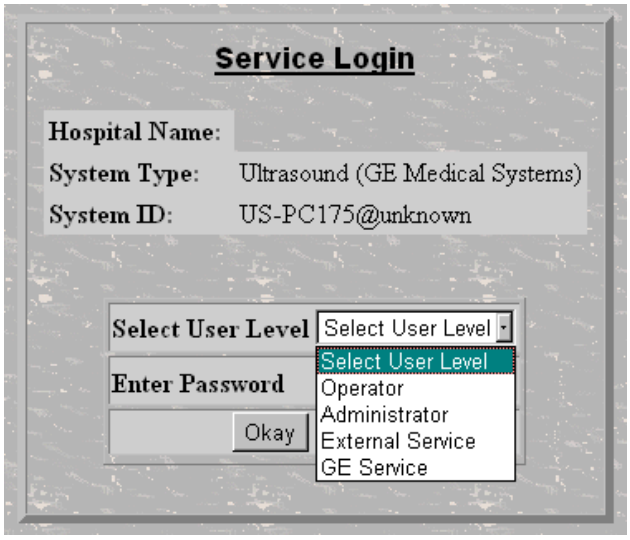


Figure 5-14 Service Login Screen

5-3-3-3 Access / Security

The service interface has different access and security user levels. Users are only granted access to the tools they are authorized to use.

Table 5-15 User Level

User Level	Access Authorization
Operator	These service tools are normally used in-house and are protected with a special scanner configuration that is not allowed to leave the facility.
Administrator	Use the OnLine Center access method provided by *iLinq*.
External Service	Required for a external Service other than GE FE.
GE Service	Requires a network connection and knowledge of a password.*

*NOTE: *For a GE Field Engineer, the password changes at specific intervals.*

Except for *iLinq*, all access to the service interface is via the Network port. A modem on the scanner is specifically intended for *iLinq* use.

Every access request, whether successful or not, will be logged into a service access log that is viewable to authorized users.

Section 5-4

Logs	Descriptions	
System	Software bug information for software engineering to debug the software.	
Power	Not used for LOGIQ 7.	
Infomatics	Exam information	
Temperature	Error (!!)	The error occurred in the temperature with "!!" mark. In the time when the error occurred, the message "Temp is above safe limit. Check air-filter! Shutdown in #seconds." appears in the status bar and the system is automatically shut down. The temperature which the error occurs: • 75 degrees or higher for Rack Temperature (1) • 65 degrees or higher for Rack Temperature (2) • 65 degrees or higher for HV Temperature
	Warning (@@)	The warning occurred in the temperature with "@@" mark. In the time when the warning occurred, the message "This system is overheated! Check air-filter!" appears in the status bar. The temperature which the warning occurs: • 70 degrees or higher for Rack Temperature (1) • 60 degrees or higher for Rack Temperature (2) • 60 degrees or higher for HV Temperature
	Info (^^)	The information occurred in the temperature with "^^" mark to call attention. In the time when the information occurred, the message "Approaching the overheat limit! Check air-filter!" appears in the status bar. The temperature which the information occurs: • 65 degrees or higher for Rack Temperature (1) • 50 degrees or higher for Rack Temperature (2) • 50 degrees or higher for HV Temperature
	Others	Temperature information
Probe	Displays the probe name and connector #.	
Board	Displays the Part #, Board #, and Dip switch revision.	
DICOM		

Password

The following windows request entry of Password. This allows you to be entered into Utility function or Service function with different access and security use levels.

5-4-1 For Operator Login Window

When you login the LOGIQ7 application with a different user level, this window is open.
You can modify the user level and password without restraint using one of the Utility function (**Utility > Admin > Users**).

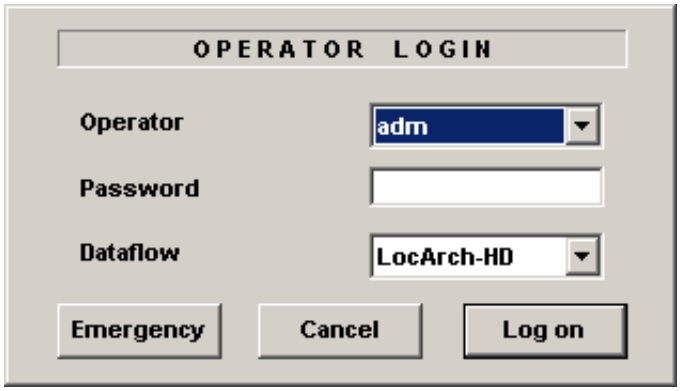


Figure 5-15 Operator Login window

5-4-2 For Service Login Window

When you access the Common Service Desktop, this window is open.
The user level and password are preset. They can NOT be modified.

Table 5-16 Password to enter common service desktop

User Level	Password
Operator	uls
Administrator	uls
External Service	gogems
GE Service	The password must change at specific intervals. (every six month)

5-4-2 For Service Login Window (cont'd)

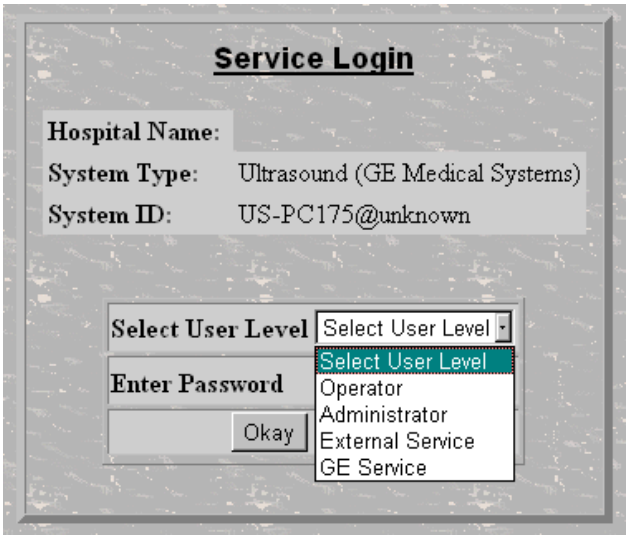


Figure 5-16 Service Login window

Section 5-5
Air Flow Control

5-5-1 Air Flow Distribution

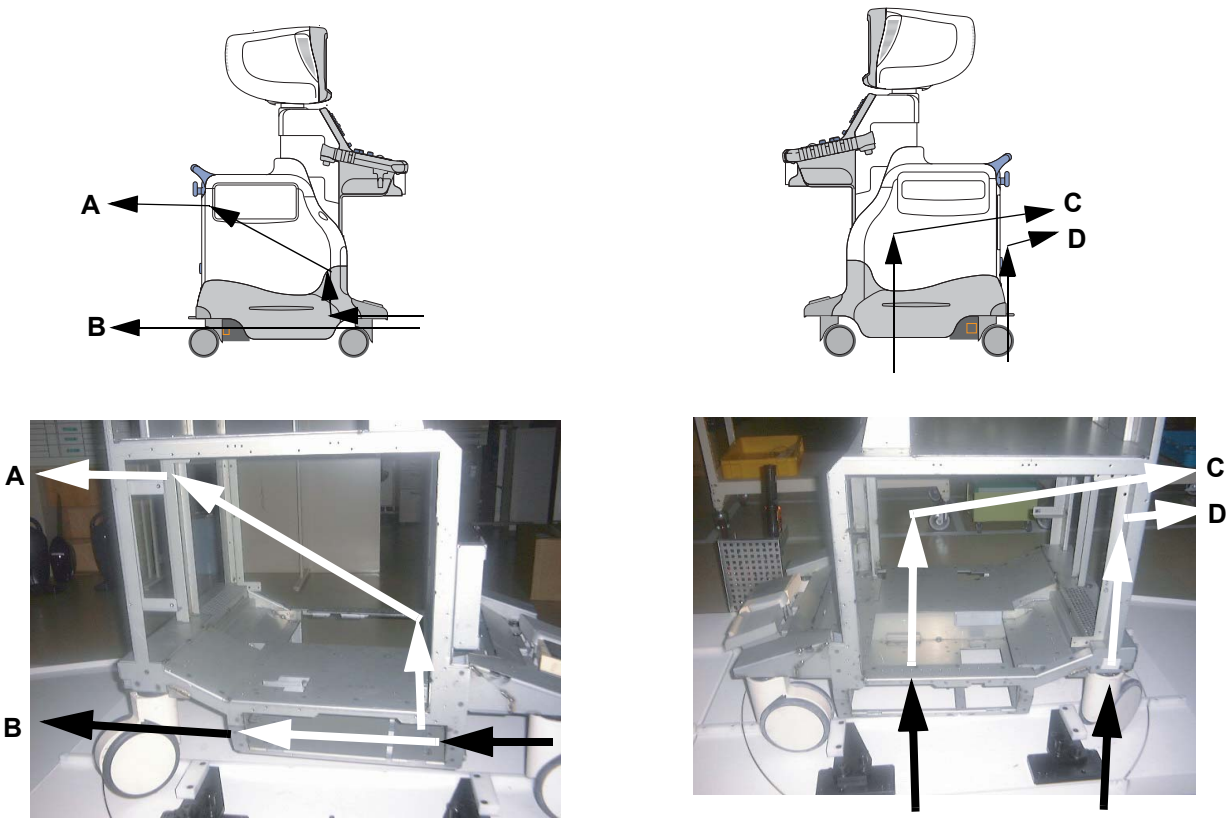


Figure 5-17 Air Flow Inside the Scanner

The four air flow pathes allow the scanner to be cooled down as shown in the figure above.

- Path A (Front lower left > Filter > PC Box > Rear upper left) for PC Box cooling.
- Path B (Front lower left > Filter > LV unit > Rear lower left) for LV unit cooling.
- Path C (Bottom right > Filter > NEST Assy > Rear upper right) for NEST Assy cooling.
- Path D (Rear bottom right > Filter > HV unit > Rear upper right) for HV unit cooling.

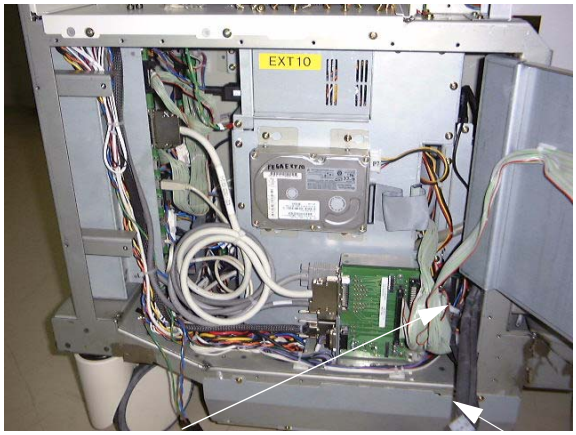
5-5-2 Filters

The scanner contains the three filters located at:

- Front lower left for air flow of the LV unit and PC box.
- Bottom right for air flow of the NEST Assy.
- Rear bottom right for air flow of the HV unit.

5-5-3 Fans

Fan for HV unit



Fan for PC Box

Fans for LV unit

Fans for NEST Assy

Figure 5-18 Fans

The scanner contains the eight fans at the following positions for producing an air flow.

- Two fans: Inside the LV unit for air flow path A and B
- One fan: On the PC Box for air flow path A
- Four fans: At the bottom of the NEST Assy for air flow path C
- One fan: On the HV unit for air flow path D

Section 5-6
Monitor Video Specification

5-6-1 Input

Standard	Format	Signal	Sync	DDC	Termination
SVGA	800 x 600 / 75 Hz	RGB: 0 - 700 mV	H: TTL V: TTL	VESA DDC2 signals	75 ohms

5-6-2 Outputs

5-6-2-1 SVGA

Standard	Format	Signal	Sync	DDC	Termination
SVGA	800 x 600 / 75 Hz	RGB: 0 - 700 mV	H: TTL V: TTL	VESA DDC2 signals	75 ohms

5-6-2-2 TV Format

Type	Standards	Termination
SVHS	NTSC EIA and PAL BDGHI	75 ohms
Composite Video	NTSC EIA and PAL BDGHI	75 ohms
RGB	NTSC EIA and PAL BDGHI	75 ohms
B&W	NTSC EIA and PAL BDGHI	75 ohms

5-6-2-3 PAL BDGHI

General	SVHS-luma	SVHS-croma	Composite	RGB	B&W
Line/field: 625/50 FH: 15625 Hz FV: 50 Hz Bandwidth: 6MHz (luma)	Signal: 100 IRE 100% amplitude Sync: 43 IRE	Burst amplitude: +/- 21.5 IRE, 10 cycles Fsc: 4.43361875 MHz 100% saturation	Summed luma and croma	Signal: 0-700 mV Comp sync/H sync/ V sync: 0.3 - 4 Vpp	SVHS luma

5-6-2-4 NTSC EIA

General	SVHS-luma	SVHS-croma	Composite	RGB	B&W
Line/field: 525/60 FH: 15734 Hz FV: 59.94 Hz Bandwidth: Min. 4.2MHz (luma)	Signal: 92.5 IRE (from black level) 100% amplitude Blanking setup: 7.5 IRE Sync: 40 IRE	Burst amplitude: +/- 20 IRE, 9 cycles Fsc: 3.579545 MHz 100% saturation	Summed luma and croma	Signal: 0-700 mV Comp sync/H sync/ V sync: 0.3 - 4 Vpp	SVHS luma

5-6-3 SVHS and Composite Video

5-6-3-1 Basic DC Parameters

Parameters	NTSC	PAL
White relative to blank	714 +/- 7 mV	700 +/- 7 mV
Black relative to blank	54 +/- 7 mV	0
Sync relative to blank	-286 +/- 7 mV	-300 +/- 7 mV
Burst amplitude (nominal, p-p)	286 +/- 7 mV	300 +/- 7 mV

Chapter 6
Service Adjustments

Section 6-1
Overview

6-1-1 Purpose of this chapter 6

This section describes how to test and adjust the scanner. These tests are optional. You may use them to check the system for errors.

Table 6-17 Contents in chapter

Section 6-2
Power Supply Adjustments

This system contains three power supply modules; HV unit, LV unit, and ATX PS. However, the LV unit only can be adjusted.

6-2-1 Cautions and Warnings

6-2-2 Access to Adjustments

1.) Remove the left side cover.
2.) Remove the LV unit cover.
3.) Remove the bracket, then pull out the LV unit Assy with the cables connected.

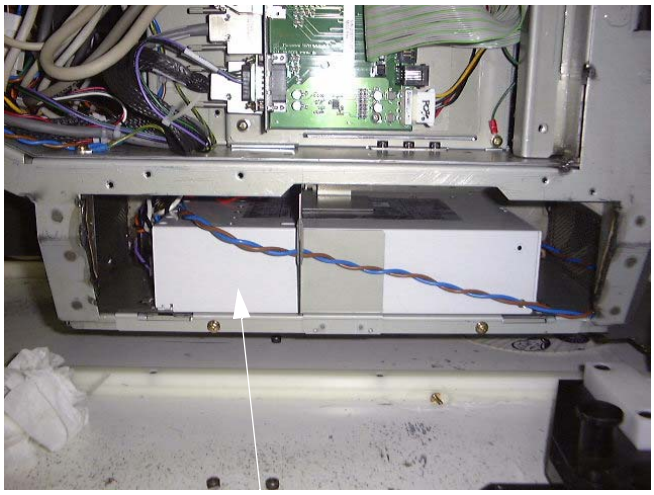


Figure 6-19 LV Unit Assy

6-2-3 Adjustments Procedures

1.) Using the following VRs, DC output can be adjusted.

Table 6-18 DC Output Specification for LV Unit

VR	Specifications
VR1	3.4V +/- 34mV
VR2	5V +/- 50mV
VR3	6V +/- 60mV
VR4	-6 V +/- 60mV
VR5	12V +/- 120mV
VR6	-12V +/- 120mV

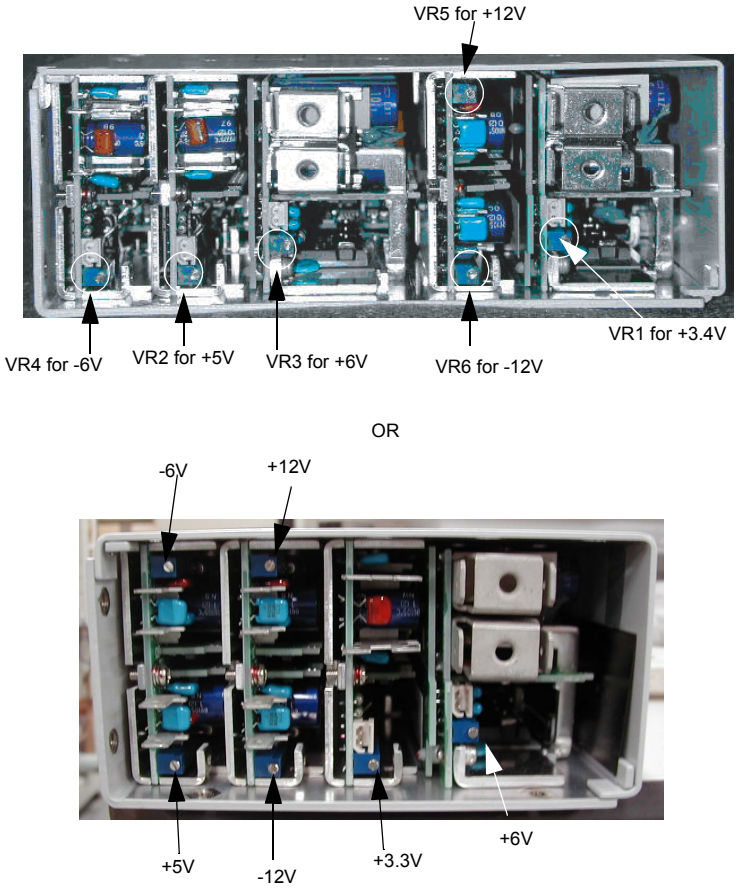


Figure 6-20 VRs for Adjusting DC Output

Section 6-3
Caster Brake/Swivel Function Adjustments

6-3-1 Brake Function Adjustment

The LOGIC 7 contains front and rear brake lock adjusters. They are separately adjusted using the same method.

Figure 6-21 Locations of Brake Lock Adjusters

1.) Loosen the two lock nuts of the brake adjuster.
2.) Rotate the adjuster until the caster lock lever comes into the center of the inspection slit.
3.) After completion of adjustment, tighten the lock nuts securely.

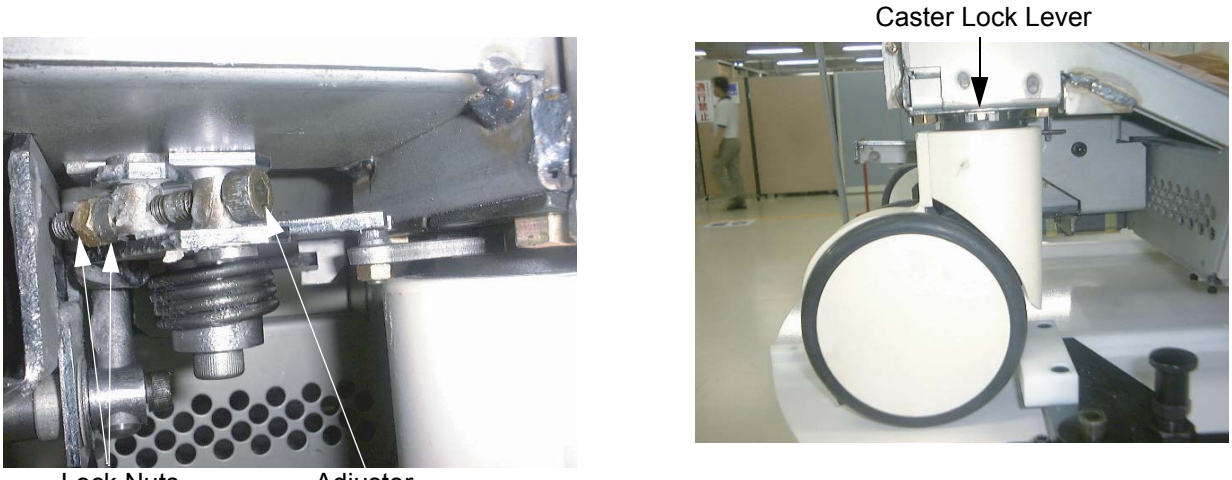


Figure 6-22 Adjusting the Brake

6-3-2 Swivel Function Adjustment

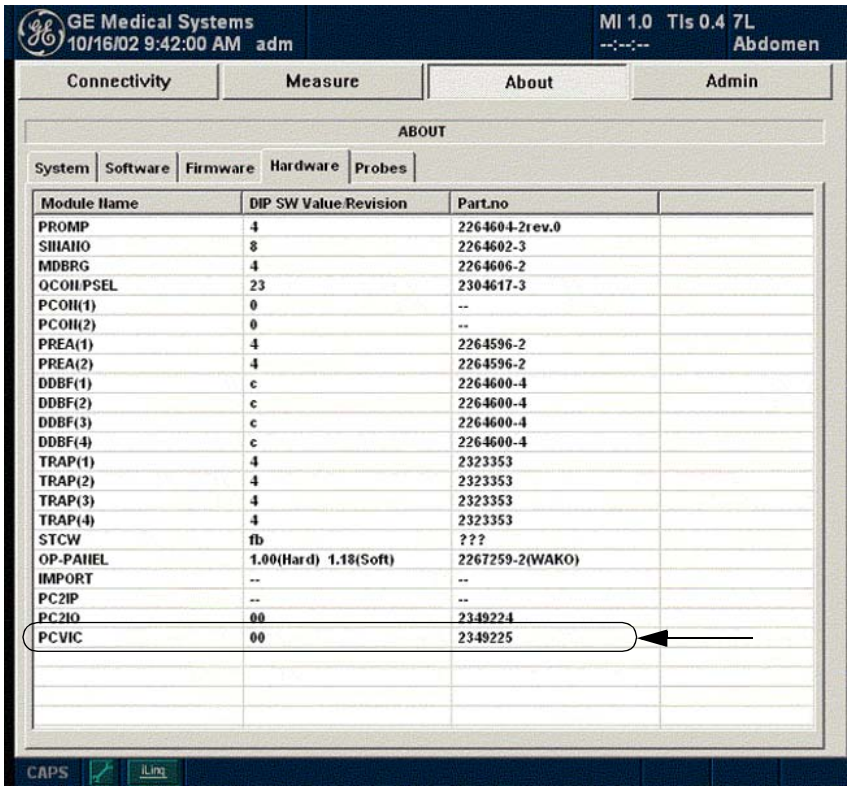
The LOGIC 7 contains one swivel lock adjuster. It can be adjusted using the same method as brake function adjustment described above.

Figure 6-23 Locations of Swivel Lock Adjuster

Section 6-4
Monitor and LCD Adjustments

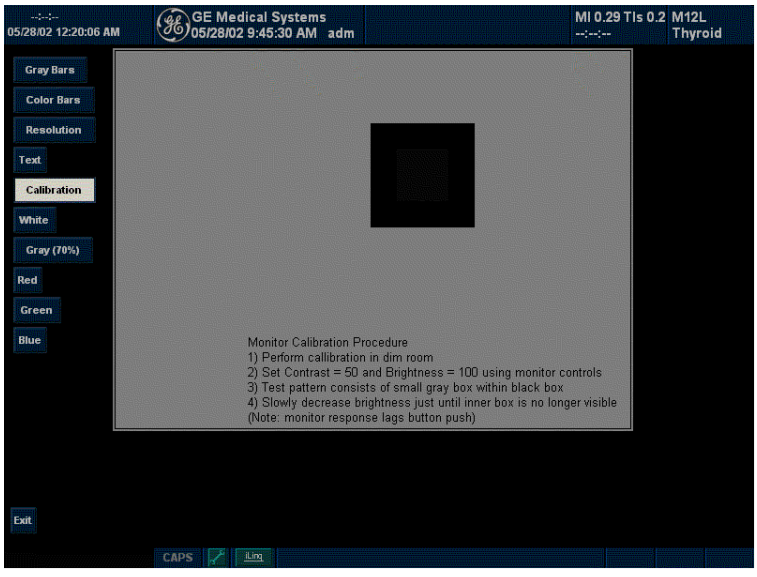
6-4-1 Contrast and Brightness Adjustment

Before calibrate the Monitor, check your PCVIC or DGVIC Part Number on the Utility Screen. The typical setting value changes with its Part Number.



To adjust the contrast and brightness:

1.) Select Calibration from the Test Pattern Utility Touch Panel. The test pattern consists of a small box inside a larger box.



2.) Press the Toggle button (1) for contrast and brightness. Confirm that the contrast (or brightness) indicator is displayed on the monitor. If the brightness is displayed, press the toggle button again.

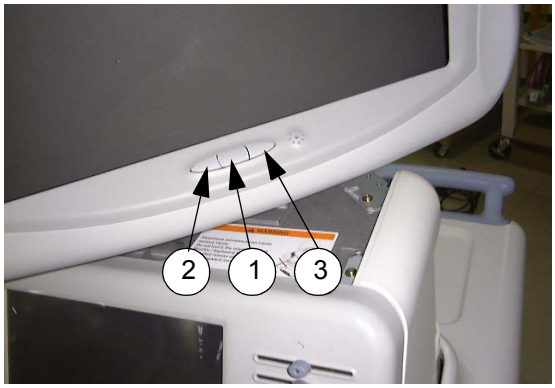


Figure 6-24 Monitor Adjustment buttons

3.) Press the Adjustment button (+, 2) to increase contrast (or brightness).
Press the Adjustment button (-, 3) to decrease contrast (or brightness).
The amount of contrast (or brightness) is shown on a slide bar on the screen. Refer the following table for the setting.

4.) Set the Contrast according to the table below.

5.) Set the Brightness at 100. Then slowly decrease the Brightness until the inner box is no longer visible. Please note that the monitor response to this adjustment logs behind the button push.

Table 6-19 Contrast Recommended Setting

Room Condition	Monitor Adjustment		
	Contrast for PCVIC other than 2349225	Contrast for PCVIC 2349225	Contrast for DGVIC 2349225-2 or later
Dark room for Radiology/ Cardiology	50	45	50
Dim room for Radiology/ Cardiology	60	55	60
Bright room for OB	70	65	70
Dark room for Cardiology	60	55	60

Record the final brightness and contrast settings and leave this information withe the system. Generally speaking, do not change the controls once they have been set, the display becomes the reference for the hard copy device(s).

NOTE: After readjusting the monitor's Contrast and Brightness, readjust all preset and peripheral settings.

6-4-2 LCD Adjustment

This adjustment must be performed when always replacing:

- PC Box Assy
- Keyboard Assy
- Cable between LCD unit and PC Box

1.) Check the followings:

- Proper balance of the LCD display as shown in Figure 6-25
- No Jitter (Phenomenon that a character does not move sideways)

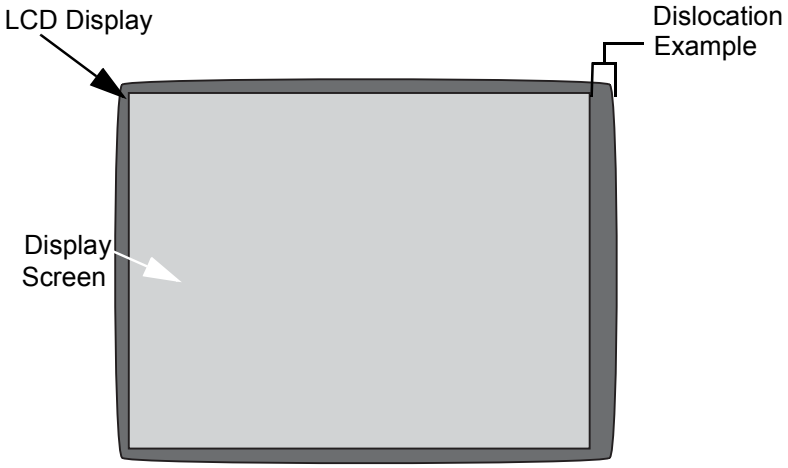


Figure 6-25 Example of LCD Bad balance

NOTE: If the location of the LCD screen is appropriately set in center, do not proceed this adjustment procedures.

2.) Open the OP Panel, and hold the OP Panel using maintenance service rod. Refer to Replacement Procedure in chapter 8 for the procedures.

3.) Find out the notch to access OSD Switch located at backside of the LCD as shown in Figure 6-26. Press the switch inside of the notch.

Figure 6-26 Switch Location

NOTE: Be careful not to cut fingers with notch.

4.) OSD menu is shown on the LCD display.

5.) Remove the maintenance rod, and re-install the OP Panel. Refer to Replacement Procedure in chapter 8 for the procedures.

6.) Using **SELECT** button, select **AUTO ADJUST**. The letters will be blue when it is selected.

⚠ **NOTICE** Never select AUTO CONTRAST in this menu. Selecting AUTO CONTRAST might occur in an improper contrast.

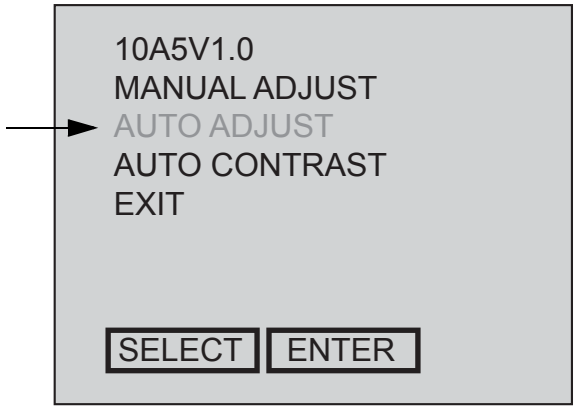


Figure 6-27 OSD Softmenu 1

7.) Make sure that the **AUTO ADJUST** is selected, then touch **ENTER**.

8.) LCD display Auto Adjustment procedures will be started automatically.

9.) After finishing the Auto Adjustment procedures, the following menu is displayed on the LCD.

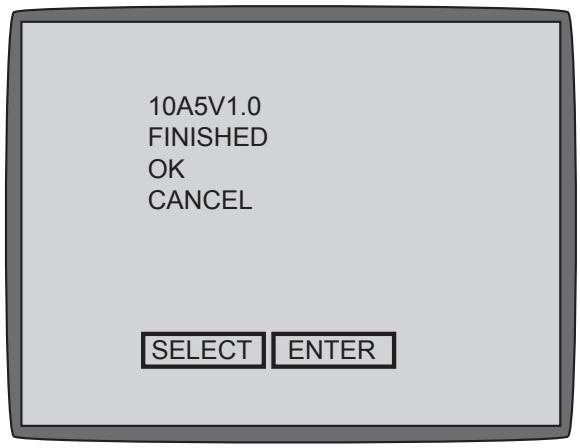


Figure 6-28 OSD Softment 2

10.) Make sure that the LCD displacement is fixed and shown at the center location.

11.) If it is fixed appropriately, select **OK** then touch **ENTER** to go on to the next step.
If the display is not adjusted yet, select **CANCEL** then touch **ENTER** to repeat the adjustment procedures form step 6.

12.) The first screen is shown on the display. Touch **SELECT** three times to select **EXIT**. Refer to Figure 6-27.

13.) Touch **ENTER** button. OSD menu will be finished, and go back to regular display.

Section 6-5
Cleaning the Trackball

1.) Power OFF the scanner.
2.) Place your fingers onto the notches of the trackball retainer ring.
3.) Rotate the retainer ring counterclockwise until it can be removed from the keyboard.

Figure 6-29 Rotating the Retainer Ring

4.) Lift off the inner retainer and trackball from the keyboard.

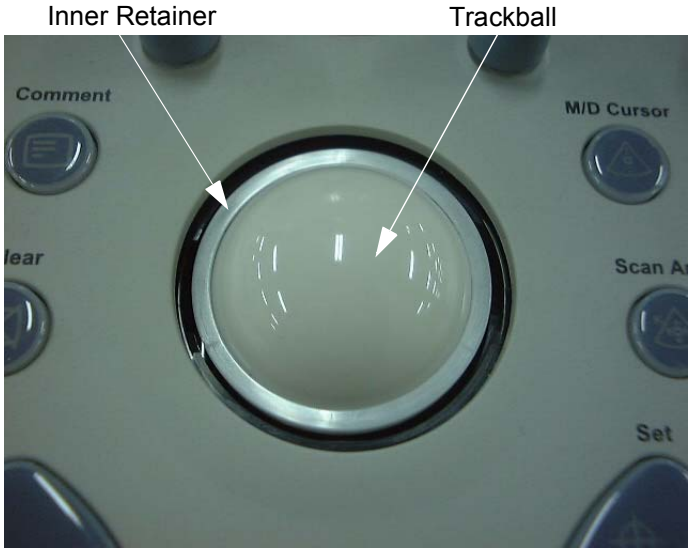


Figure 6-30 Removing Inner Retainer and Trackball

5.) Wipe off any oil or dust from the trackball using a cleaner or dry cloth.

6.) Wipe off any oil or dust from the trackball housing, rollers, and small ball, using a cleaner or cotton bud.

NOTICE When cleaning the trackball housing, make sure not to spill or spray any liquid into the trackball housing (Keyboard or system). Use either ethanol, isopropyl alcohol or VCR head cleaner to clean the trackball assembly.
Avoid other solvents that may damage the mechanical parts of the trackball assembly.
Do not apply much force to the small ball.

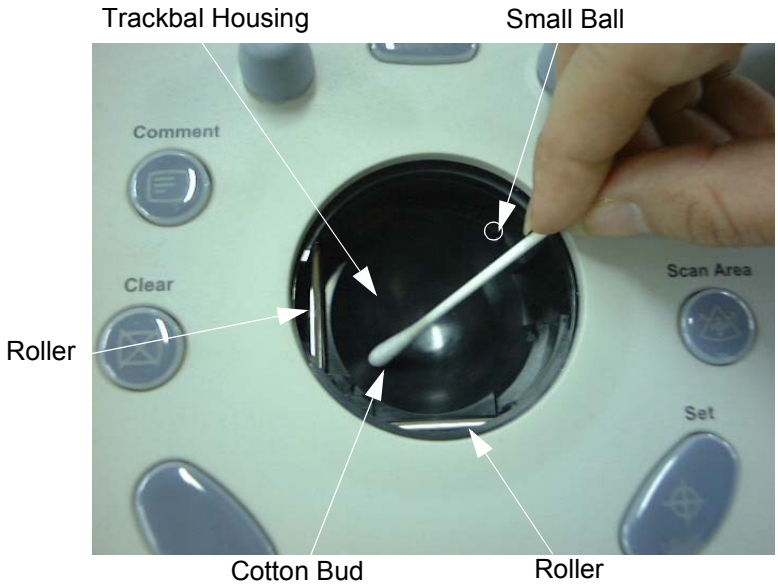


Figure 6-31 Cleaning TrackBall and Housing

7.) Wipe off any oil or dust from the two rollers using a cleaner or cotton bud.

NOTICE When cleaning the roller, make sure not to spill or spray any liquid into the trackball housing (Keyboard or system). Use either ethanol, isopropyl alcohol or VCR head cleaner to clean the trackball assembly. Avoid other solvents that may damage the mechanical parts of the trackball assembly.

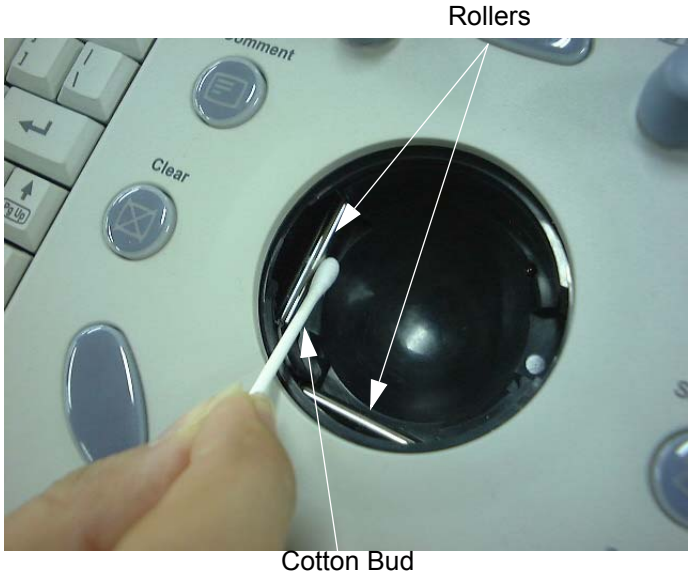


Figure 6-32 Cleaning Rollers

8.) Insert the trackball into the housing.

9.) Place the trackball and inner retainer into the housing with its stopper facing down.Lift off the inner retainer and trackball from the keyboard.

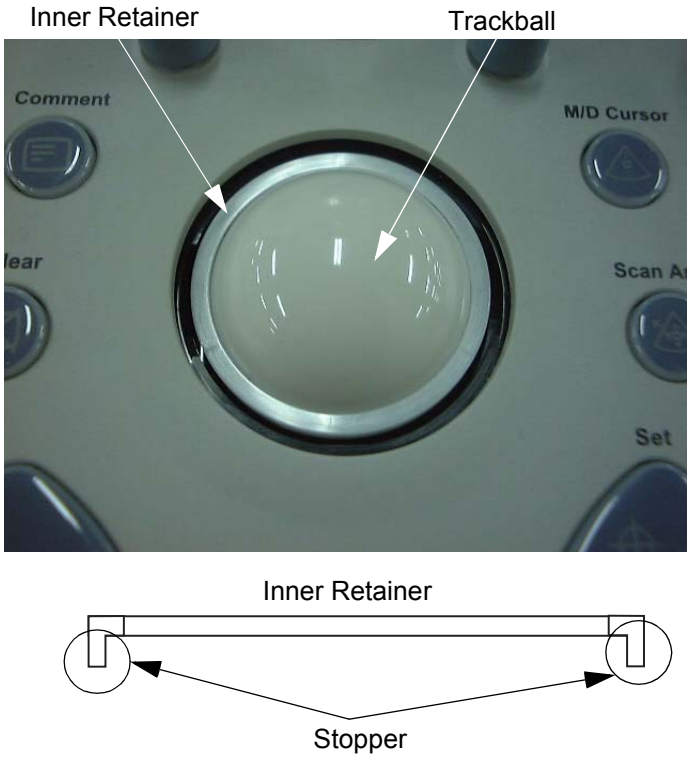


Figure 6-33 Removing Inner Retainer and Trackball

10.) Install the trackball retainer ring onto the inner retainer, then rotate it clockwise until its notches are set in the horizontal position.

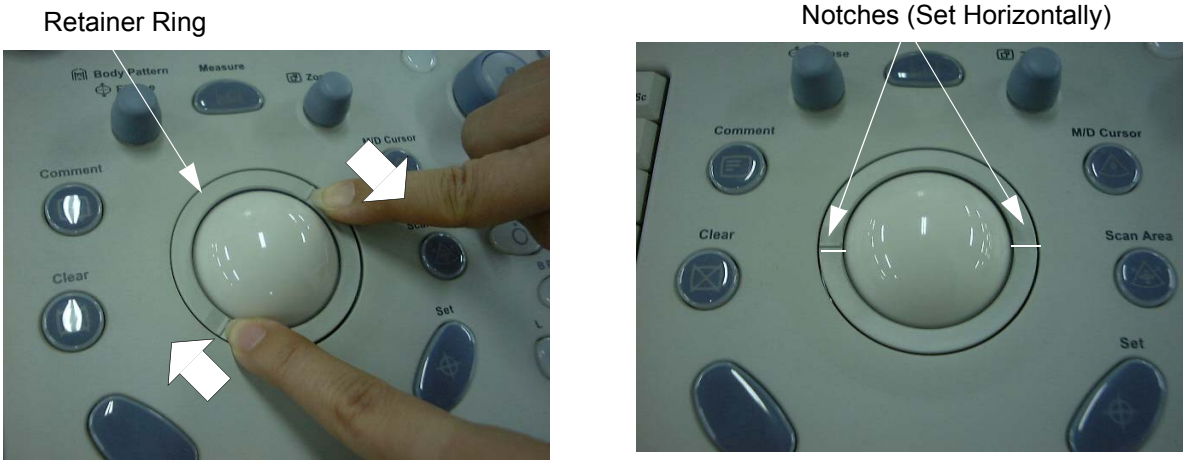


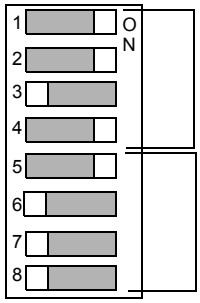
Figure 6-34 Rotating the Retainer Ring

Section 6-6
Jumper and Dip Switch Setting

6-6-1 Dip Switch Setting

The dip switch must be set properly according to the table below. The value in the table (Dip Switch setting) represents the bit location as shown.

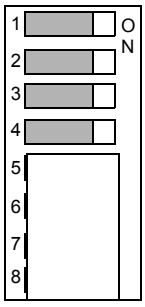
Example: "E4 (h)" is set as shown.



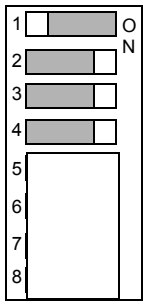
4 (lower 4 bits)

E (Upper 4 bits)

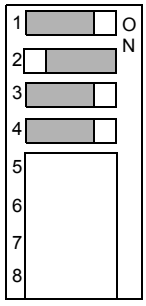
Bit Setting for DIP Switch 1 to 4 (lower 4 bits)



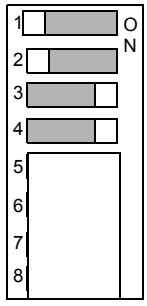
0 (h)



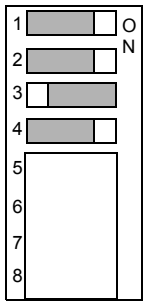
1 (h)



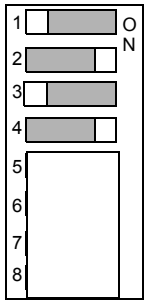
2 (h)



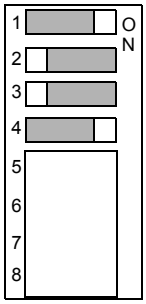
3 (h)



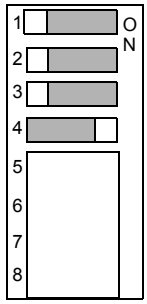
4 (h)



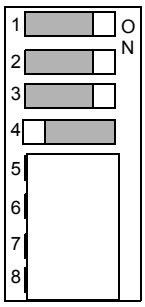
5 (h)



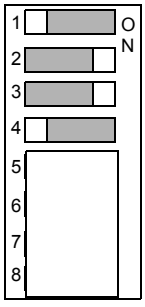
6 (h)



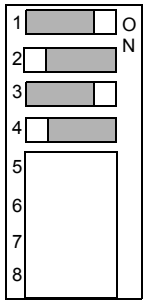
7 (h)



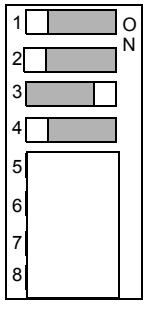
8 (h)



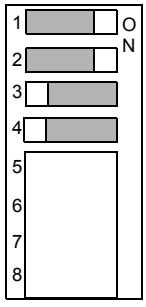
9 (h)



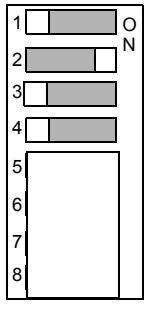
A (h)



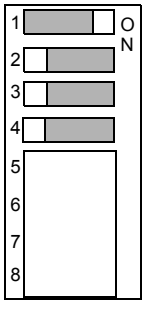
B (h)



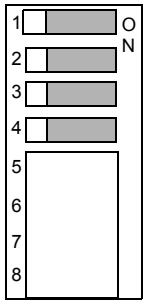
C (h)



D (h)



E (h)



F (h)

Bit Setting for DIP Switch 5 to 8 (Upper 4 bits)

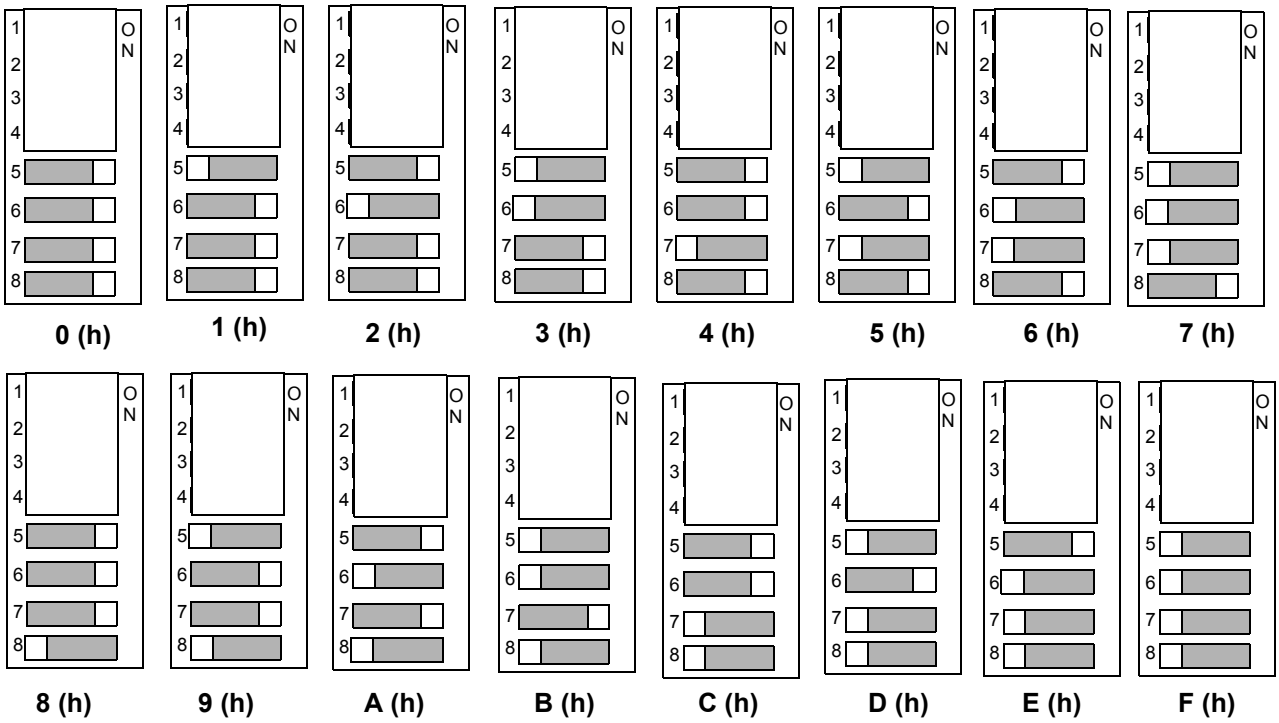


Table 6-20 Dip Switch Setting

Board	Part Number	Bit Setting for DIP Switch
PREA	2264596	00 (h)
	2264596-2	04 (h)
TRAP	2264598 rev1	00 (h)
	2264598 rev2	01 (h)
TRAP 2	2323353	04 (h)
	2323353-2	08 (h)
	2323353-3	0C (h)
	2323353-4	10 (h)
TRAPCW (TRAP2 + TXCW)	2323450	24 (h)
	2323450-2	28 (h)
	2323450-3	2C (h)
	2323450-4	30 (h)

Table 6-20 Dip Switch Setting

Board	Part Number	Bit Setting for DIP Switch
DDBF	2264600 rev0	00 (h)
	2264600 rev1	01 (h)
	2264600-2	04 (h)
	2264600-3	08 (h)
	2264600-4	0C (h)
	2264600-5	10 (h)
SINANO	2264602	00 (h)
	2264602-2	04 (h)
	2264602-3	08 (h)
MDBRG	2264606	00 (h)
	2264606-2	04 (h)
PROMP	2264604	01 (h)
	2264604-2 rev0	04 (h)
	2264604-2 rev1	05 (h)
QCON	2304617	00 (h)
	2304617-2	12 (h)
	2304617-3	23 (h)
	2304617-4	33 (h)
STCW	2277244 rev2	00 (h)
	2277244 rev3	01 (h)
	2277244 rev4	02 (h)
	2277244-2	04 (h)

6-6-2 Jumper Setting

6-6-2-1 MDBRG Board

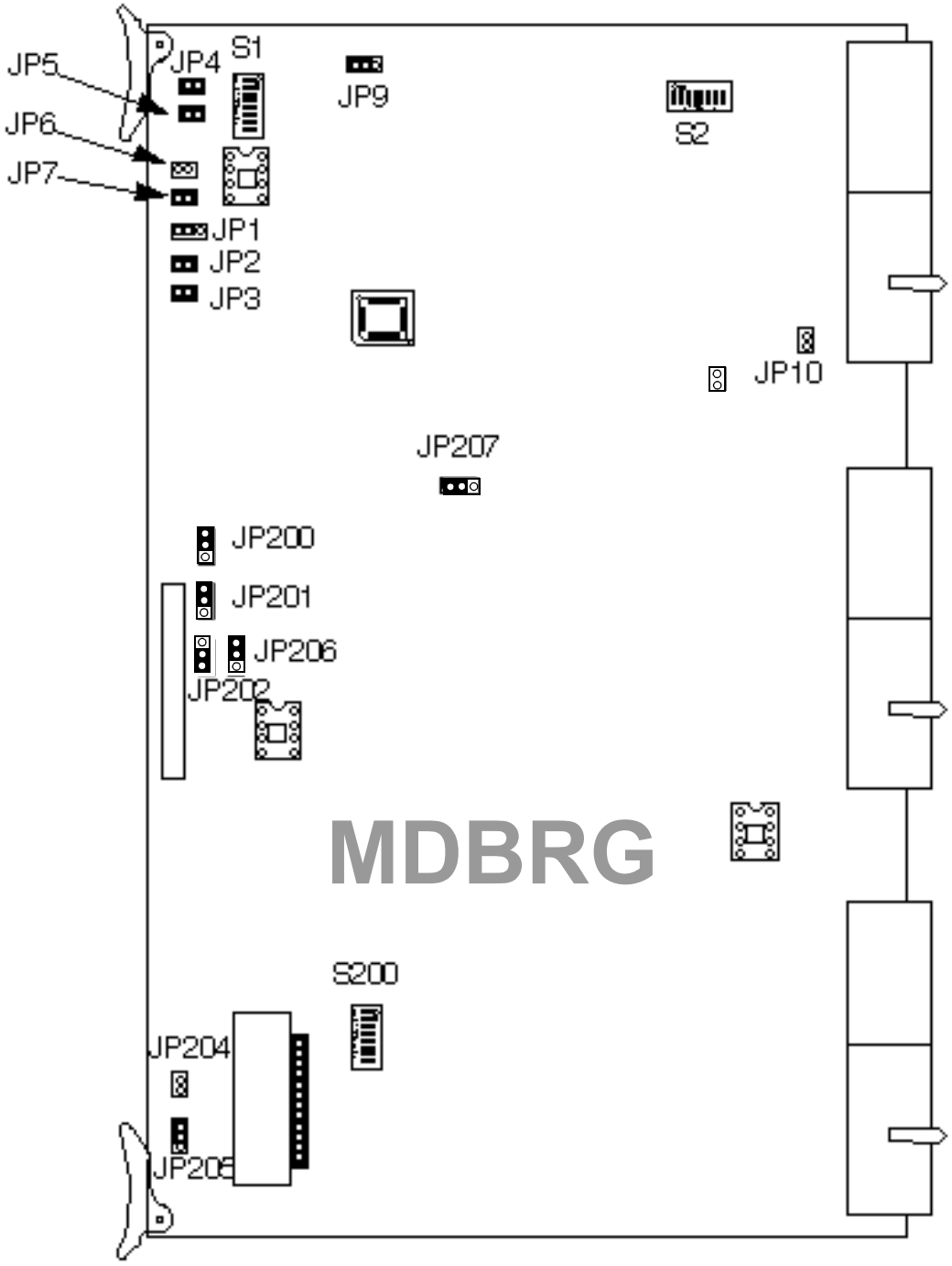
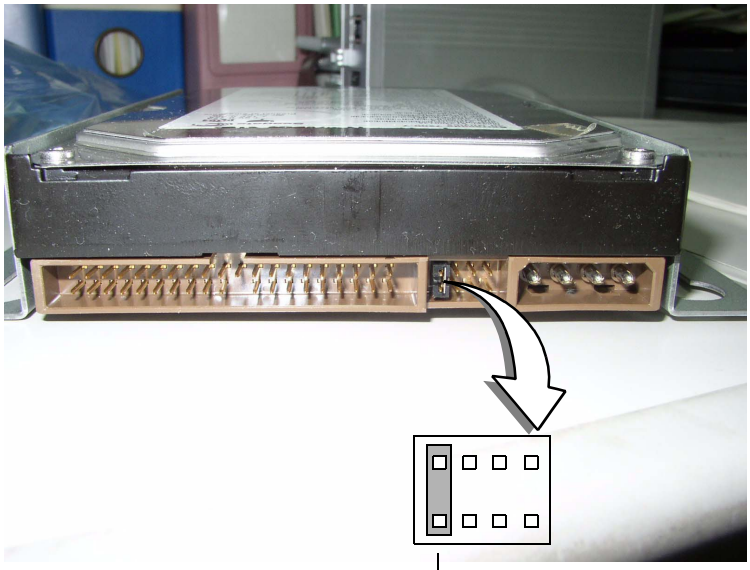


Figure 6-35 Jumper and Dip Switch Setting for MDBRG

6-6-2-2 HDD

Always set the jumper between MASTER pins.



Chapter 7
Diagnostics/Troubleshooting

Section 7-1
Overview

7-1-1 Purpose of Chapter 7

This section describes how to setup and run the tools and software that help maintain image quality and system operation. Very basic host, system and board level diagnostics are run whenever power is applied. Some Service Tools may be run at the application level. However most software tests are required.

Table 7-21 Contents in Chapter 7

7-1-2 Diagnostic Procedure Summary

Although Diagnostics can be run in any order, the *Bottom-up Confidence-Building Order* outlined in this section:

- Provides a framework from which overall diagnostic testability can be discussed.
- Provides a top-level model that describes the confidence-building aspect of the diagnostics.
- Provides a logical step-by-step approach to system check-out and fault isolation.

There are two levels of diagnostic: board-level and system level.

- Board-level diagnostics are intended to test functionality of a single circuit board.
- System-level diagnostics are intended to test functionary on more than one circuit board.

Unused system components (board or signals) for each diagnostic test are drawn in gray (ghosted).

NOTE: In this document, the Host includes all hardware upstream of the PCI cable. The diagnostics in this chapter do NOT test anything upstream of the PCI cable. Therefore, any upstream hardware or software must be functional before running these diagnostics.

Chapter 8
Replacement Procedures

Section 8-1
Overview

8-1-1 Purpose of Chapter 8

This chapter describes replacement procedures for the following modules and subsystems.

Table 8-22 Contents in Chapter 8

8-1-2 Returning/Shipping Probes and Repair Parts

Equipment being returned must be clean and free of blood and other infectious substances.

GEMS policy states that body fluids must be properly removed from any part or equipment prior to shipment. GEMS employees, as well as customers, are responsible for ensuring that parts/equipment have been properly decontaminated prior to shipment. Under no circumstance should a part or equipment with visible body fluids be taken or shipped from a clinic or site (for example, body coils or an ultrasound probe).

The purpose of the regulation is to protect employees in the transportation industry, as well as the people who will receive or open this package.

NOTE: The US Department of Transportation (DOT) has ruled that "items that were saturated and/or dripping with human blood that are now caked with dried blood; or which were used or intended for use in patient care" are "regulated medical waste" for transportation purposes and must be transported as a hazardous material.

Section 8-2
Software Loading Procedures (R.3.x.x or later)

8-2-1 General

This describes a full system software loading (Base System Software Load Image + LOGIQ7 Application) procedure.

Use this instructions when:

- Performing the System Version-up (Base System Software Load Image + Application)
- Replacing the HDD with a new one (Base System Software Load Image + Application)
- Performing the System revision-up (Application)

Reference: The below is the support table between Application Software version and Base System Software Load Image part number.

Application Software Version	Base System Software Load Image P/N			
	2363272 (BEP2)	2372267 (BEP2)	2372267-2 (BEP2)	2372267-3 or later (BEP2)
R. 3. 0.0 or higher	Not Supported	Not Supported	Not Supported	Supported

8-2-2 Parts Required

- Base System Software Load Image CD (Ghost CD)
- LOGIQ7 R. 3.x.x Application Software
- Blank CD-R or DVD (for patient image backup)

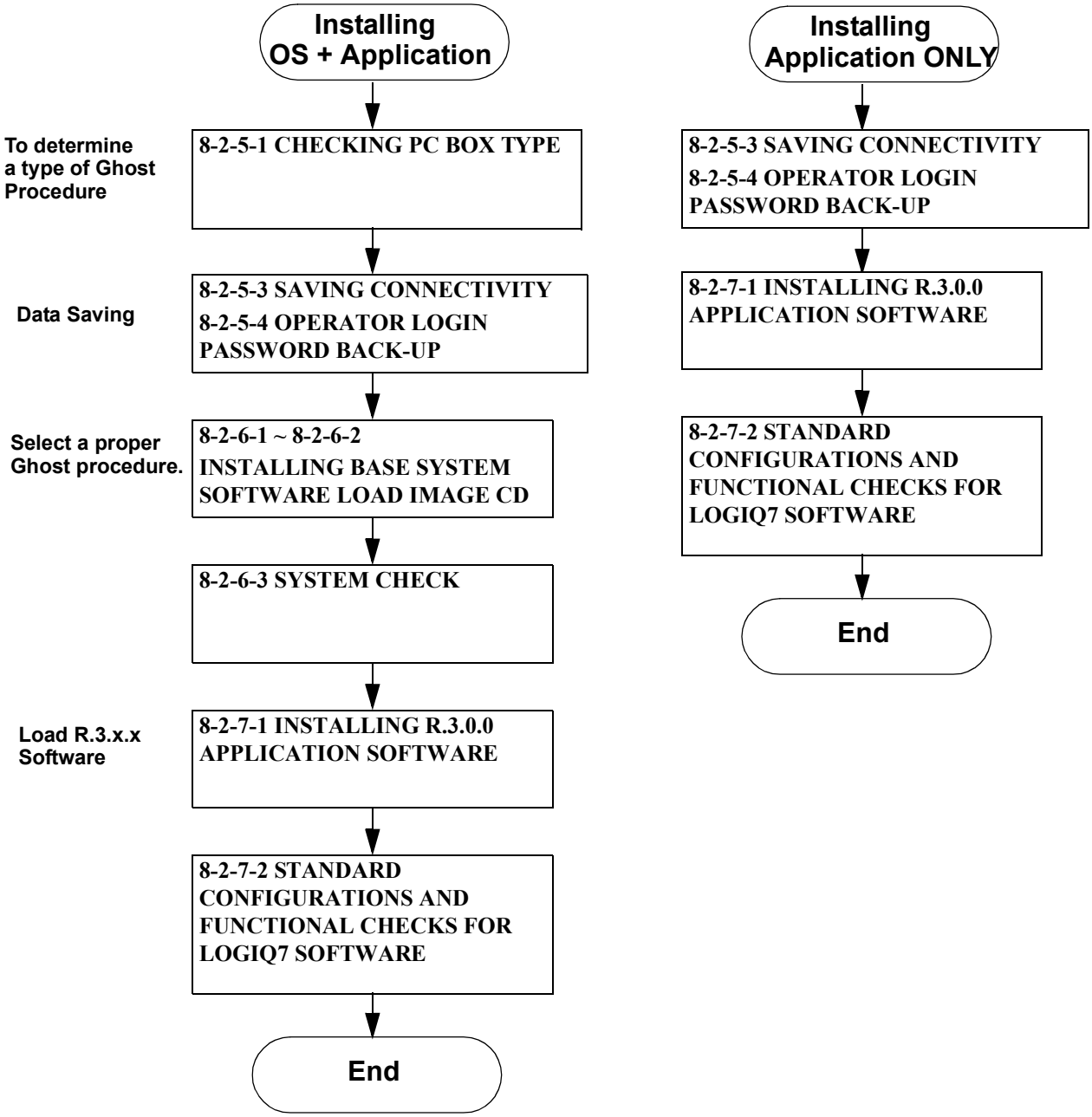
NOTICE Patient Image Data will be deleted when all of the drives are ghosted. Back up them on the CD-R's or DVDs before starting software loading.

NOTICE Insert the service dongle into the service port lodated at the rear panel before installing the Base System Software Load Image.

8-2-3 Time Required

Approximately 1 hour

8-2-4 Software Loading Steering Guide



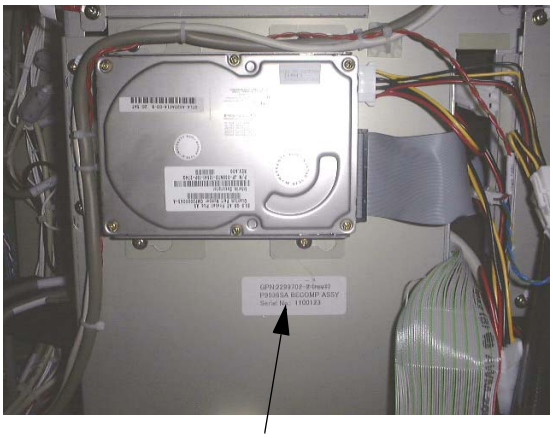
8-2-5 Before Starting Software Loading

NOTICE The sofware loading must be performed after replacing the BECOMP, DGVIC, DDBF ROM, and PREA Assy.

8-2-5-1 Checking PC Box Type

The Base System Software (OS) Installation procedure depends on the PC Box Assy. Before starting this procedure, first check which PC Box Assy is installed in the scanner.

- Open the PC Box cover. Check if **2351328 or later** (PC Box Assy Part Number) can be seen under the HDD.



PCBox Assy Number:
2351328 or later

Table 8-23 Action List

PCBox P/N	Action to be taken
2351328 or later (PC Box)	Ghost All drives (at PC Box replacement). Ghost the C drive Only (at software reloading).
Note 1: For details, follow the instructions below. Note 2: “Ghost the C drive ONLY” means that all customer data are NOT deleted.	

8-2-5-2 Deleting M&A menu

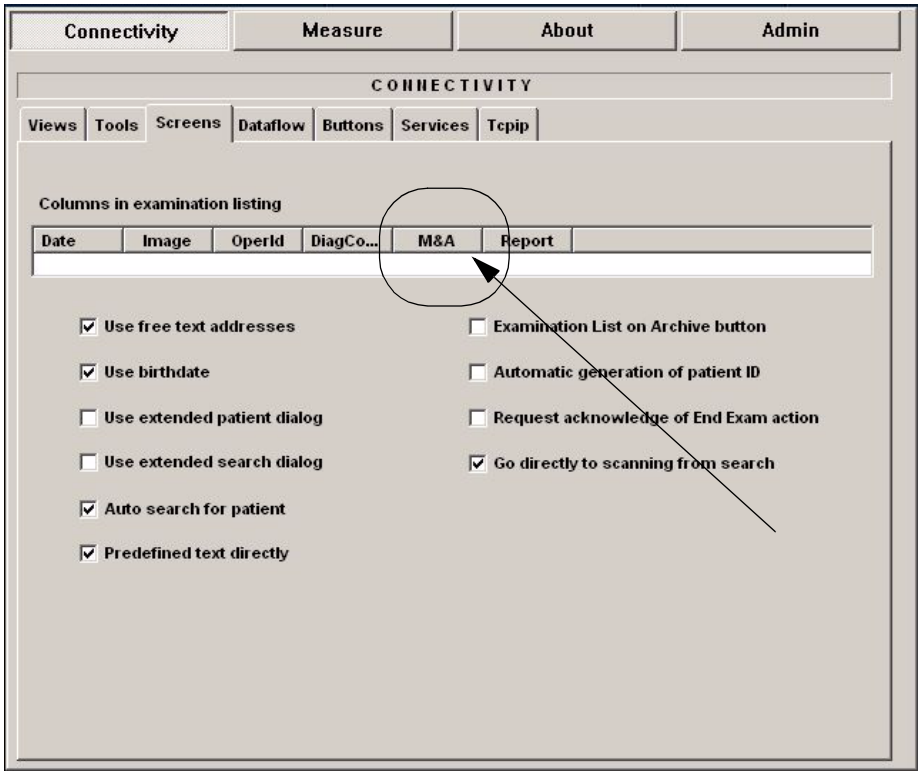
When upgrading the system from R.2.x.x to R.3.x.x, the M&A menu MUST be deleted before upgrade. This is due to user interface change between R.2.x.x and R.3.x.x.

If the M&A menu is NOT deleted and the system is upgraded to R.3.x.x, the system will be crashed (automatically shut down) whenever you use Utility.

⚠ **NOTICE** The deletion of M&A menu MUST be performed on the R.2.x.x system, because the R.3.x.x software does NOT contain the menu addition/deletion function.

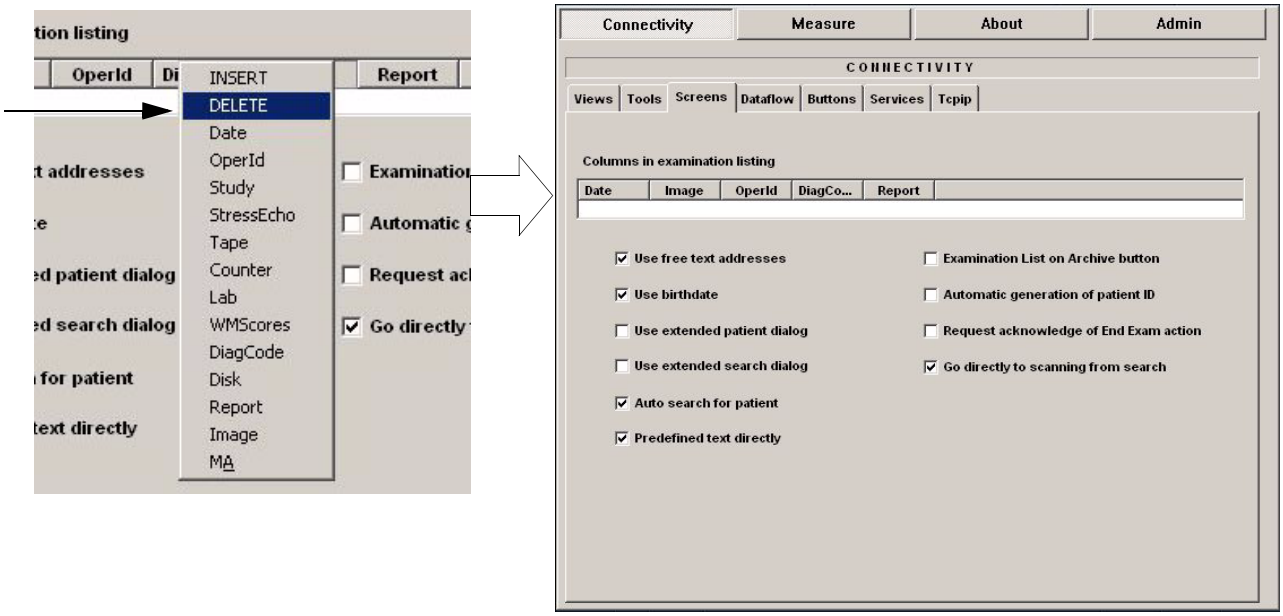
1.) Touch **Utility > Connectivity** on the touch panel and click the **Screens** tab. The following appears.

2.) Check if **M&A** item at the “Column in Examination Listing” exists,
If it does, perform the deletion of M&A item. If it does NOT, skip this section and go to 8-2-5-3, Saving Connectivity.



3.) Move the cursor onto **M&A** mune, then right-click on it to display the pull-down menu.

4.) Select **DELETE.**

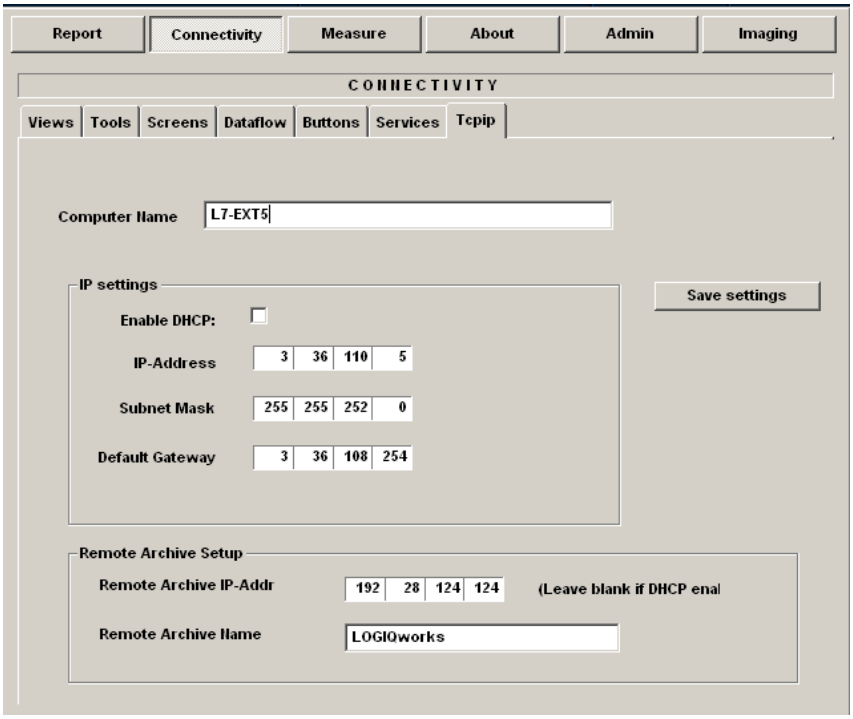


8-2-5-3 Saving Connectivity

Before starting upgrading, write down the **Connectivity Setting** for back-up.

1.) Touch **Utility > Connectivity** on the touch panel and click the **Tcpip** tab.

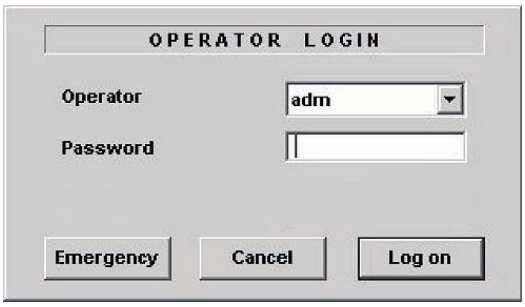
2.) Write down the following parameters:



Parameters	Descriptions (Entry for Stand-Alone System)
Computer Name	
Enable DHCP	This parameter **must NOT** be selected.
IP-Address	**(192.168.1.2)**
Subnet Mask	**(255.255.255.0)**
Default Gateway	**(192.168.1.1)**
Remote Archive IP-Addr	
Remote Archive Name	
Note : For a stand-alone system, preset values of IP adress, subnet mask, and default gateway, shown above, must entered.	

8-2-5-4 Operator Login Password Back-up

The Operator Login Password will be deleted even if the BECOMP is not replaced. So, write down the password if necessary.



Parameters	Descriptions
Operator Login Password	

8-2-5-5 Saving User Data

Save the following user data for back-up:

- Preset data (**Utility > Backup/Restore**)
- Patient image data (Refer to operation manual for back-up.)

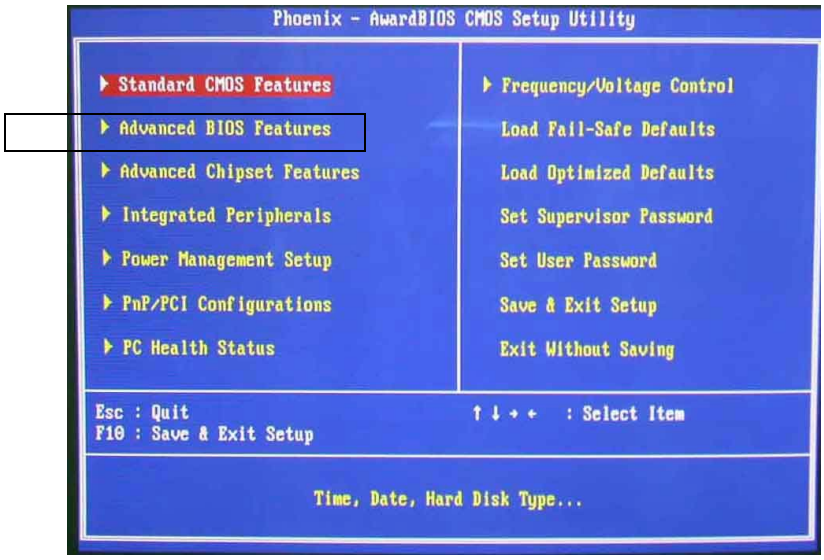
8-2-6 Installing Base System Software Load Image CD

8-2-6-1 Updating BIOS Setting (For PC Box: 2351328 Only)

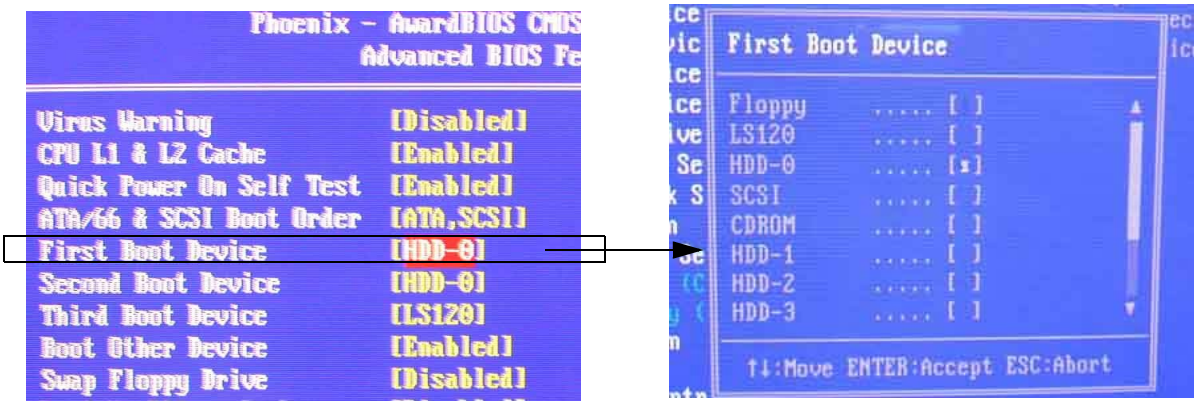
1.) Power ON the scanner.

2.) Press and hold the **DEL** key until the following screen appears.

3.) The Setup Utility screen appears. Using arrow keys, select **Advanced BIOS Features** and press the **Enter** key.

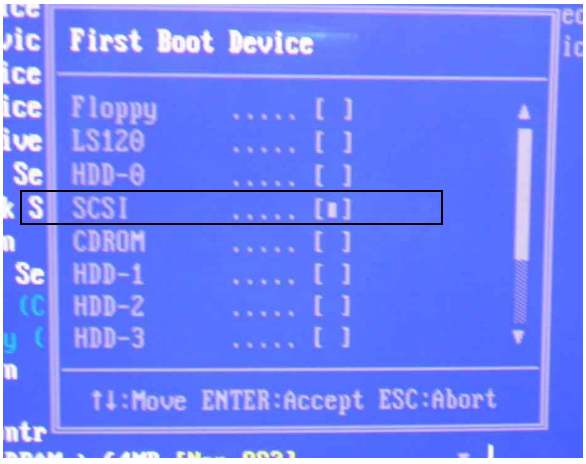


4.) Using the arrow keys, select **First Boot Drive** and press the **Enter** key. The First Boot Device screen appears.



5.) Using the arrow keys, select the following and press the **Enter** key.
For CD-RW unit model select **SCSI.** For DVD unit model, select **USB-CDROM.**

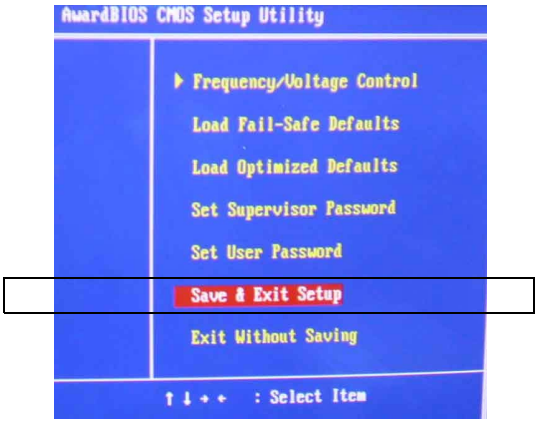
Example for CD-RW



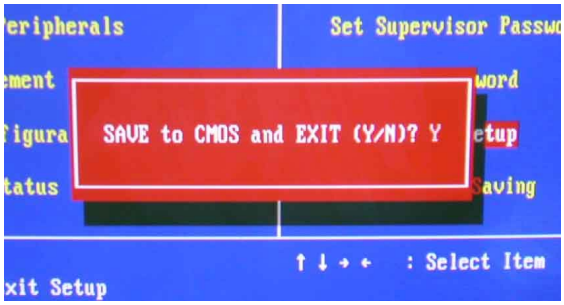
6.) Insert the **BIOS Update CD** into the CD-RW or DVD dirve.

7.) Press the **ESC** key to return to the Setup Utility screen.

8.) Using arrow keys, select **Save & Exit Setup** and press the **Enter** key.

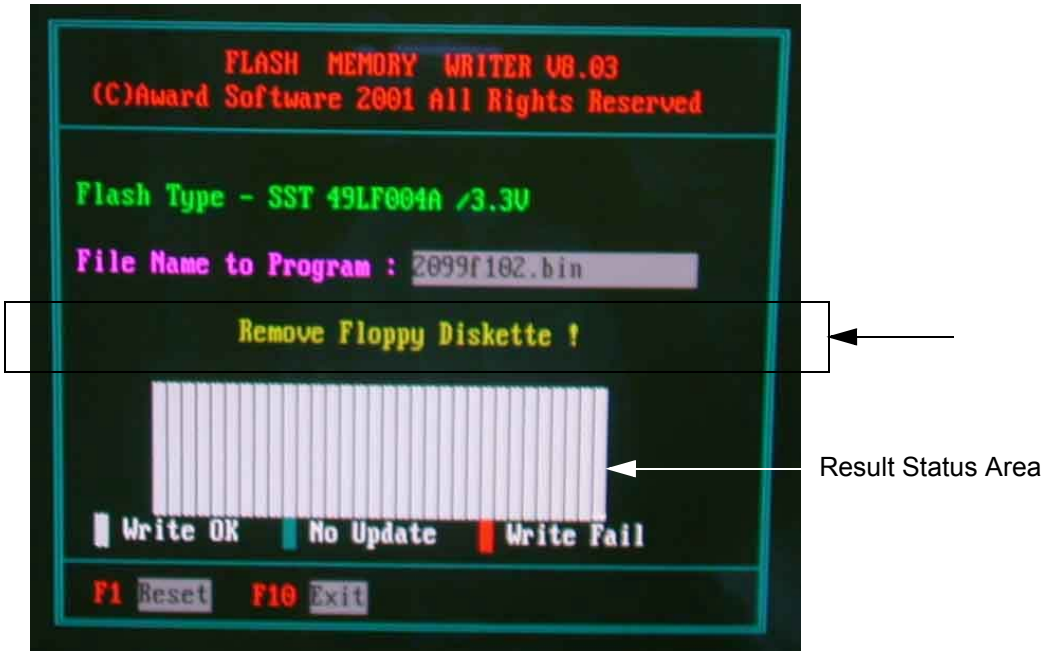


9.) The following message appears. Press the **Enter** key to restart the system.



10.) After restarting the system, the BIOS is automatically updated.

11.) When **Remove Floppy Diskette** message appears, eject the **BIOS Update CD** from the drive.

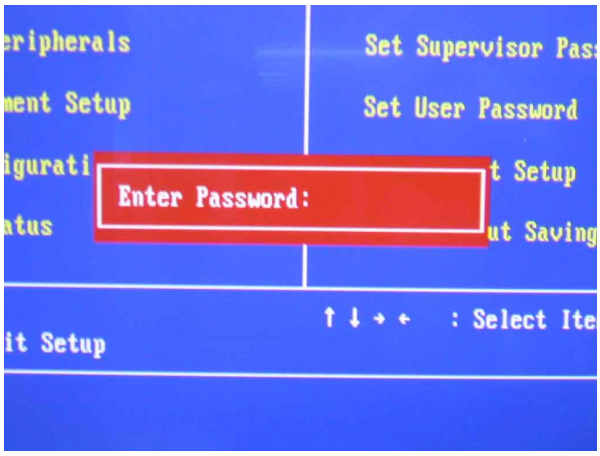


NOTICE If the **Red bar**(s) are shown in the result status area, the BIOS Update CD or mother board might be failed.

12.) Press **F1** key to restart the system. Immediately press and hold the **DEL** key until the BIOS Setup utility screen appears again.
If NOT installing Base System Software Load Image CD, select **Save & Exit Setup** and press the **Enter** key twice to exit from BIOS setup utility.

8-2-6-2 Installing Base System Software Load Image CD (For PC Box: 2351328 or later only)

1.) Enter **gehino** as a password, then press the **Enter** key.

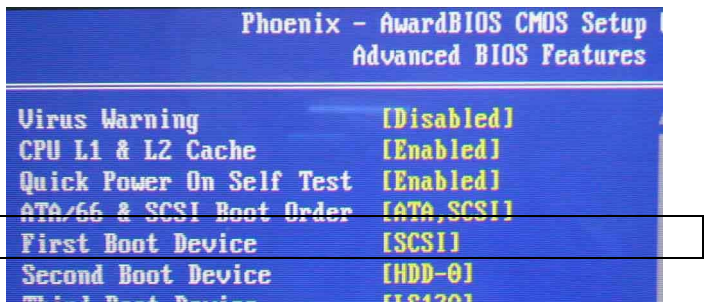


2.) The Setup Utility screen appears. Using arrow keys, select **Advanced BIOS Features** and press the **Enter** key.

3.) Verify that **SCSI or USB-CDROM** is selected as a **First Boot Device.**
For CD-RW unit model select **SCSI.** For DVD unit model, select **USB-CDROM.**

If it is not, using arrow keys, select **First Boot Device** and press the **Enter** key. Then select **SCSI or USB-CDROM** and press the **Enter** key.

Example for CD-RW

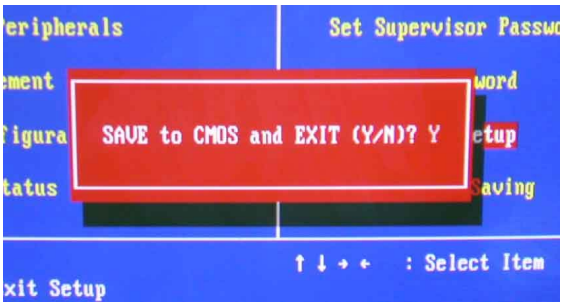


4.) Press the **ESC** key to return to the Setup Utility screen.

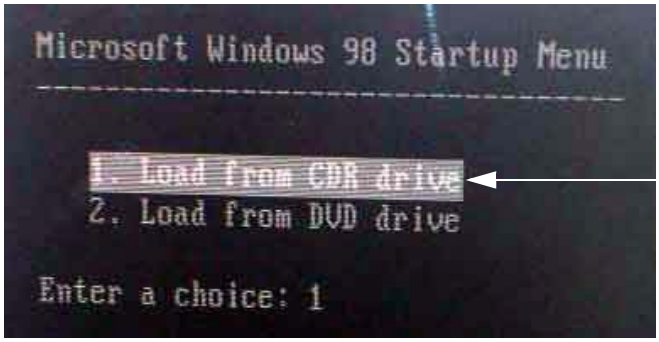
5.) Insert the **Base System Software Load Image CD** into the CD-R drive.

6.) Using arrow keys, select **Save & Exit Setup** and press the **Enter** key.

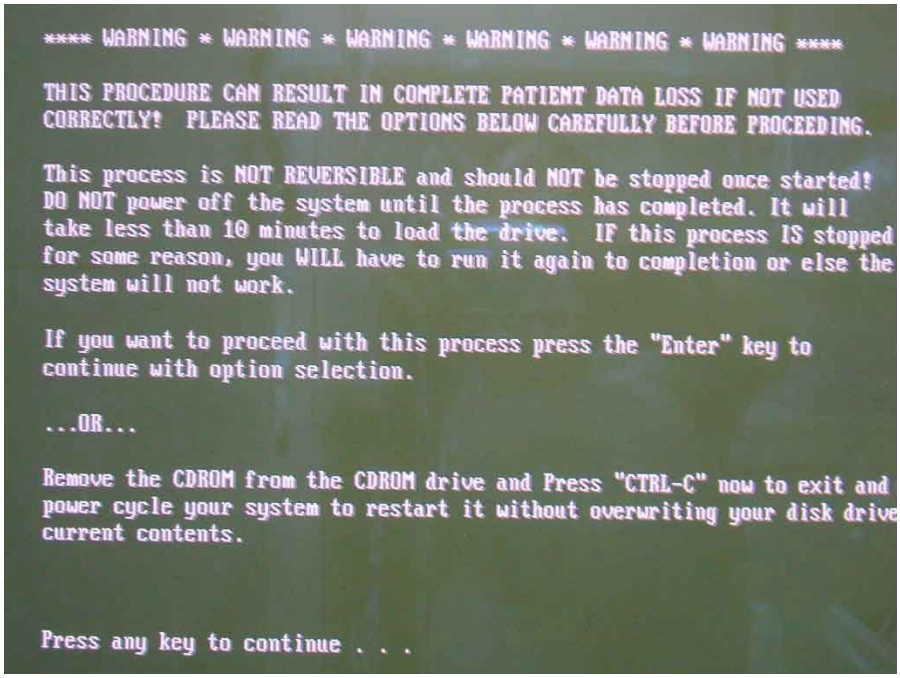
7.) The following message appears. Press the **Enter** key to restart the system.



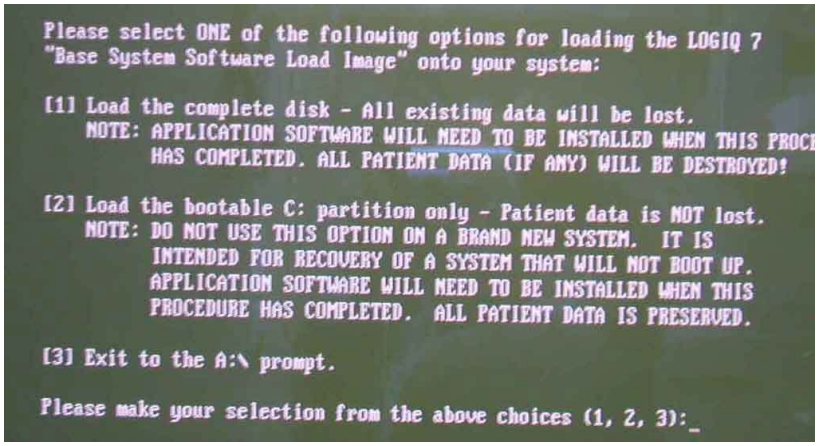
8.) For CD-RW unit model, select **1. Load from CDR Drive**, then press the **Enter** key.
For DVD unit model, select **2. Load from DVD Drive**, then press the **Enter** key.



9.) After restarting the system, when the following screen appears, press the **Enter** key.

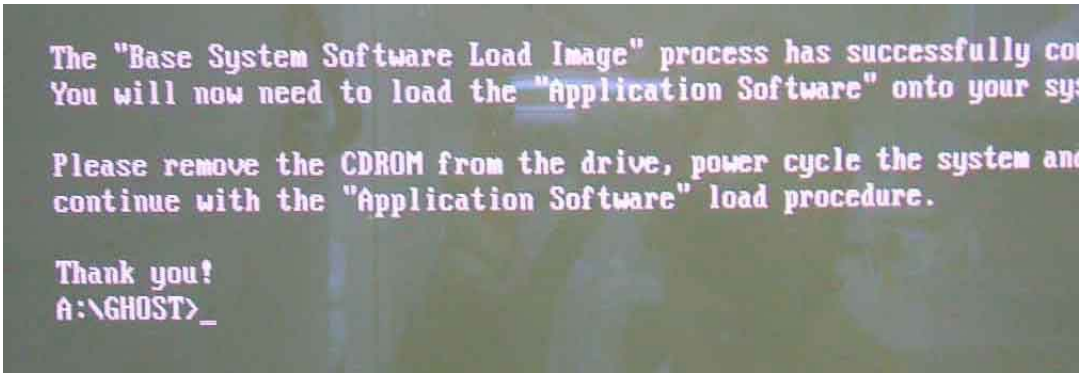


10.) The following screen appears.
For system which replaced the BECOMP, press **1** or **2**, then **Enter** to initialize all drives



NOTICE Select **1** when installing the new HDD (PC Box replacement).
Select **2** when reloading software. The Ghost procedure is performed with data of the drives D, E, and F left.

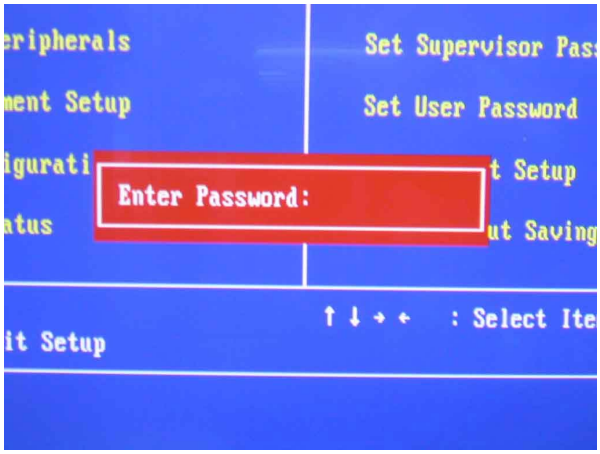
11.) Approx. four minutes later, the following screen appears. Eject the **Base System Software Load Image CD** from the drive.



NOTICE The Base System Software Load Image CD-ROM must be stored onto the upper side of the PC box using the velcro tape.

12.) To restart the system, press **Ctrl + Alt + DEL** key at the same time. Press and hold the **DEL** key until the following screen appears.

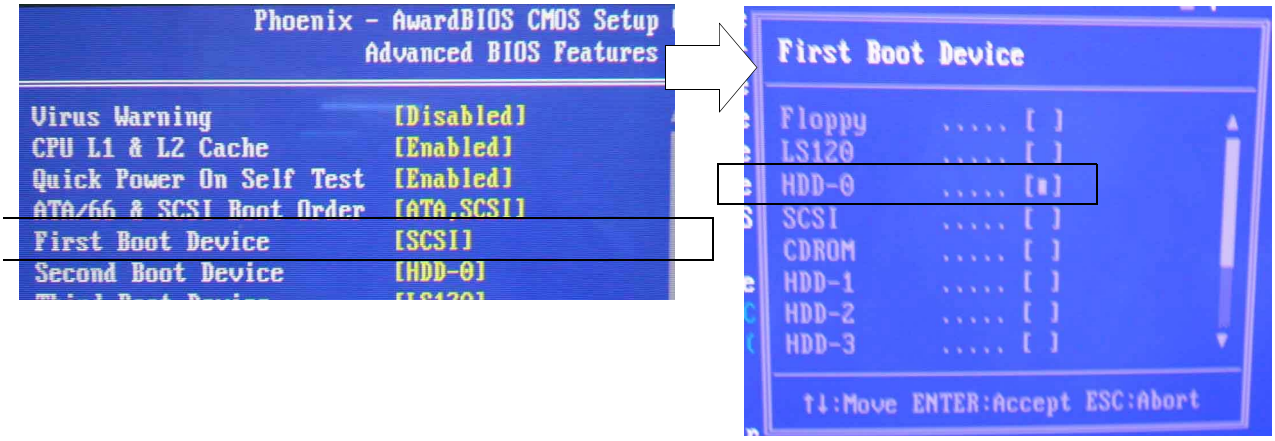
13.) Enter **gehino** as a password, then press the **Enter** key.



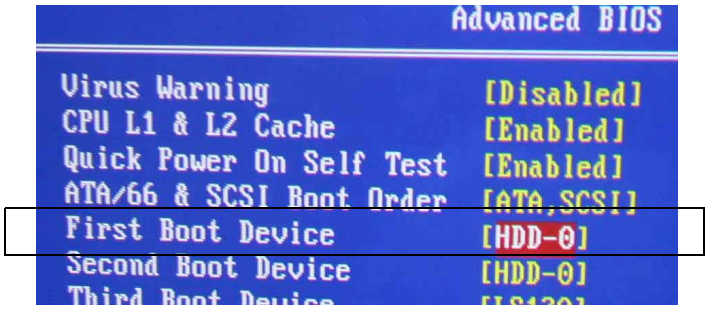
14.) The Setup Utility screen appears. Using arrow keys, select **Advanced BIOS Features** and press the **Enter** key.

15.) Using arrow keys, select **First Boot Device** and press the **Enter** key.

16.) Select **HDD-0** , then press the **Enter** key.

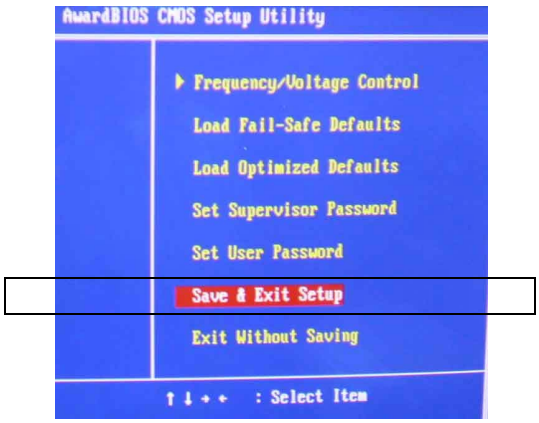


17.) Verify that **HDD-0** is selected as a **First Boot Device.**

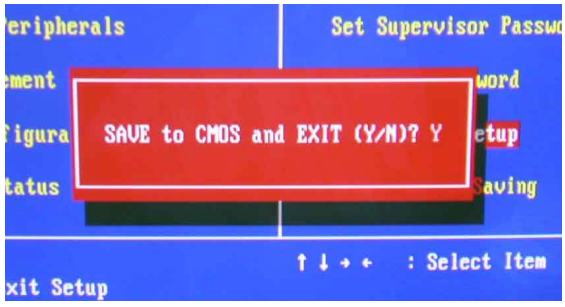


18.) Press the **ESC** key to return to the Setup Utility screen.

19.) Using arrow keys, select **Save & Exit Setup** and press the **Enter** key.



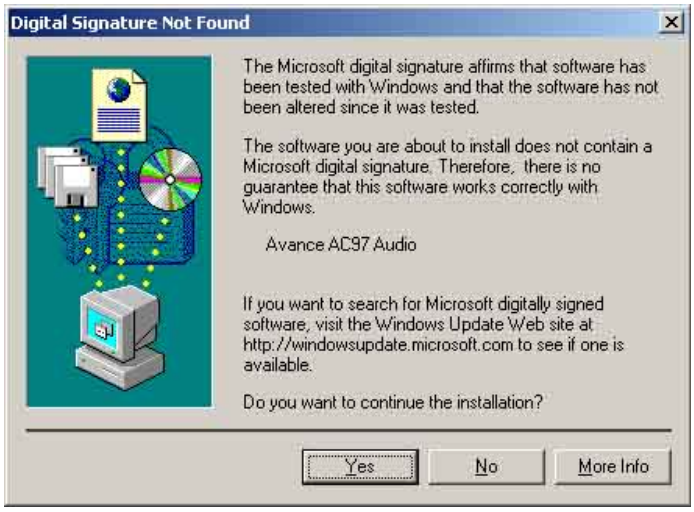
20.) The following message appears. Press the **Enter** key to restart the system. Then go to 8-2-6-3, System Check.



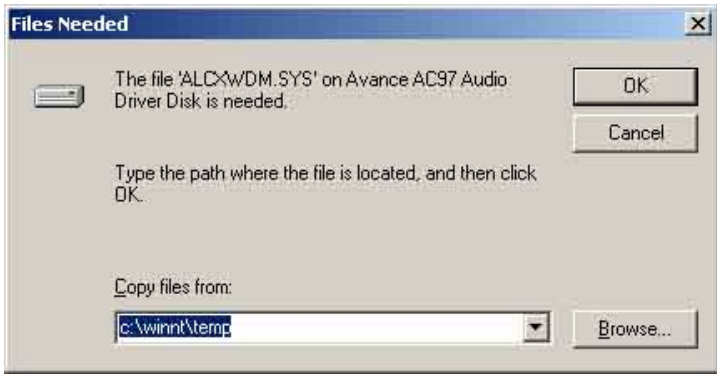
8-2-6-3 System Check

1.) Approx. two minutes later, the windows 2000 desktop appears. If the following screen appears, reset the device drivers:

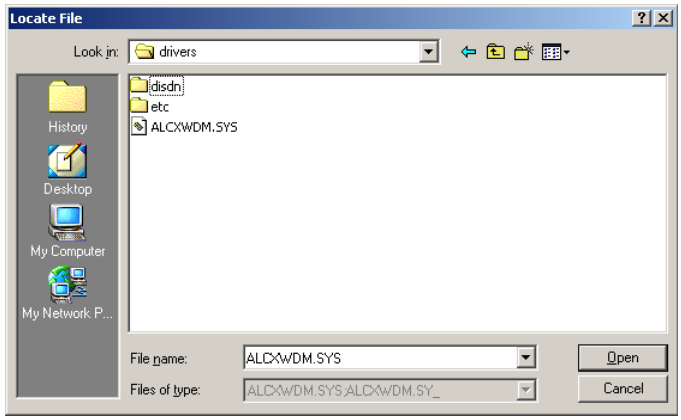
a.) Click on **Yes** using right button of the trackball.



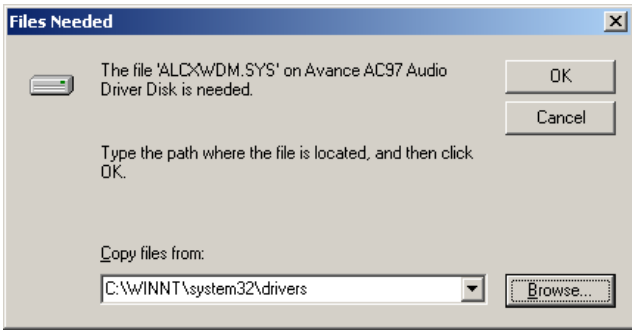
b.) Click on **Browse** and select the folder, **C:\WINNT\SYSTEM32\drivers.**



c.) Click on **Open.**



d.) Click on **OK.**



2.) Then the following screen appears. Click on **Yes** using right button of the trackball to restart the system.

NOTICE If the window above is not displayed, go to next step. If other window appears, close it.

3.) On the windows 2000 desktop, left-click on **My Computer**, then right-click on **Properties.**

4.) The System Properties window appears. Select **Hardware > Divice Manager...**

5.) Verify that **X** or **!** is not displayed.

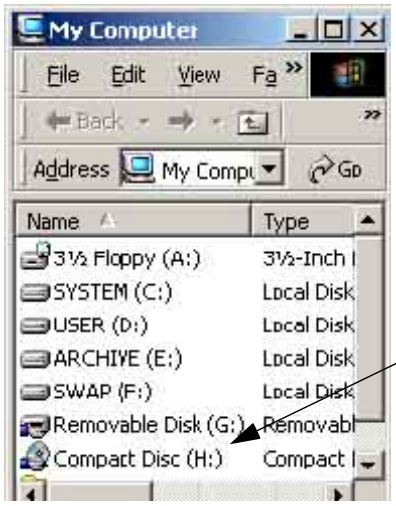
If **X** or **!** is displayed:

- Left-click on the device with **x** mark, then rigtht-click on **Enable.**
- Left-click on the device with **!** mark, then rigtht-click on **Properties** to perform the device driver reconfiguration. When some files are required, designate the file in the directories of **C:\WINNT\SYSTEM32** or **C:\WINNT\SYSTEM32\DRIVERS**. If they are not found, search them using a windows search function.

6.) Drive Letter Check:

a.) Using the right trackball button, double-click on **My Computer.**

b.) Verify that **Compact Disk (G:)** is displayed.
If it is, go to next step (Setting the UPS). If it is not, change it to **G:**



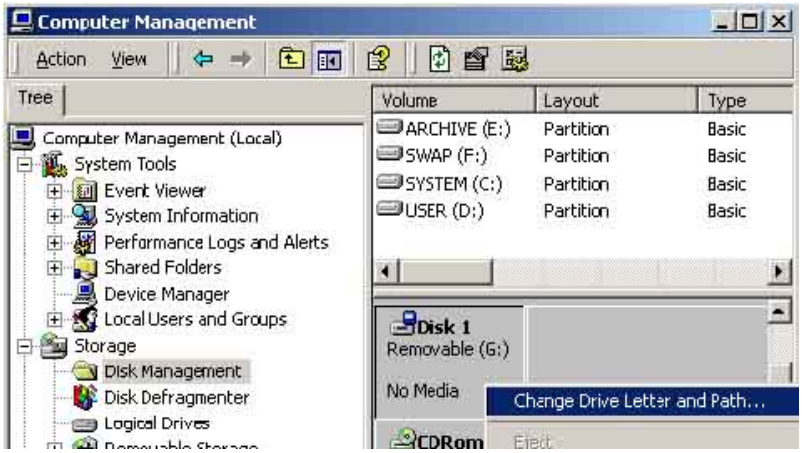
In this case,
It must be changed to
G:.

c.) Select **Start > Settings > Contorl Panel.**

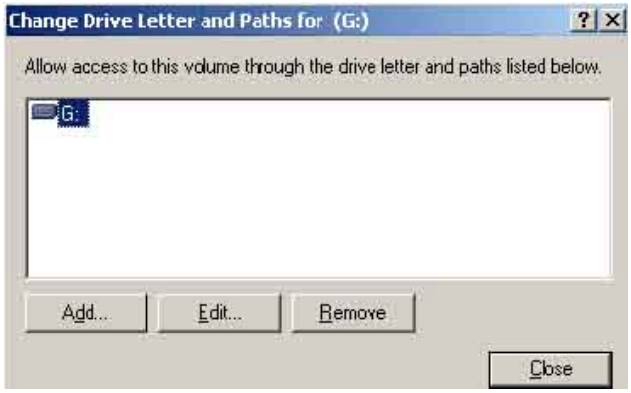
d.) Using the right trackball button, double-click on **Administrative Tools.**

e.) Using the right trackball button, double-click on **Computer Management.**

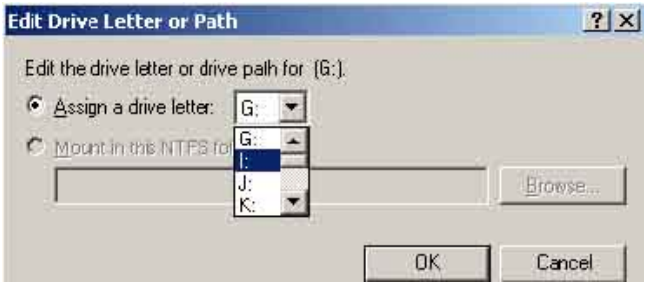
f.) Right-click on **Disk Management**, then left-click on the device assigned currently to **G:**. Right-click on **Change Drive Leter and Path...**



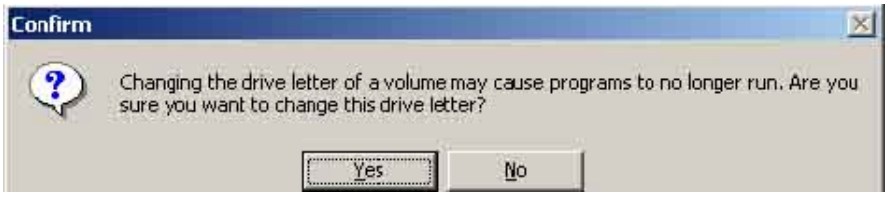
g.) Right-click on **Edit.**



h.) Select the drive other than **G:** (I: is selected in the window shown below for example.) Then click on **OK.**

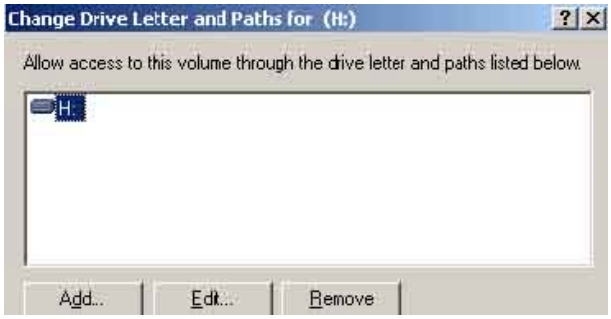


i.) Right-click on **Yes.**



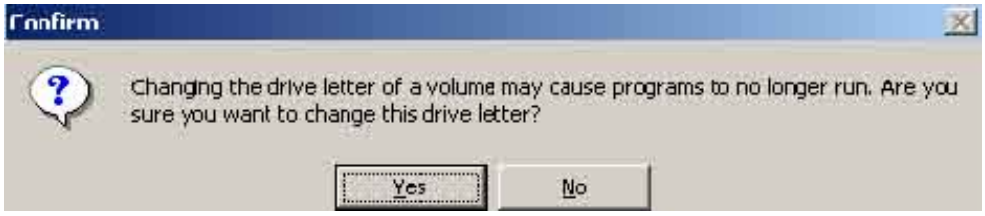
j.) Left-click on **CDRom 0**, then right-click on **Change Drive and Path...**

k.) Right-click on **Edit.**



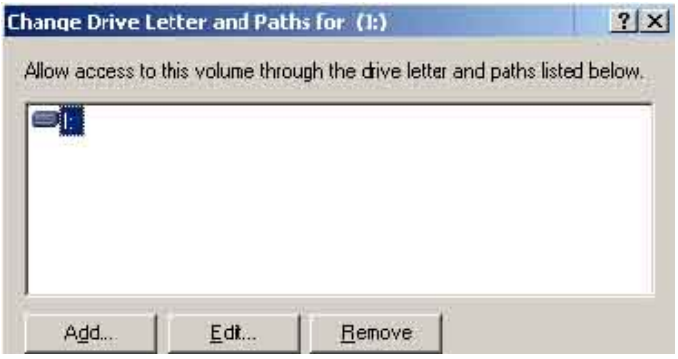
l.) Select **G:**, then right-click on **OK.**

m.) Right-click on **Yes.**



n.) Left-click on the device which changed the drive number at step f. Right-click on **Change Drive Letter and Path...**

o.) Right-click on **Edit.**



p.) Select **H:**, then right-click on **OK.**

q.) Right-click on **Yes.**

r.) Close all windows.

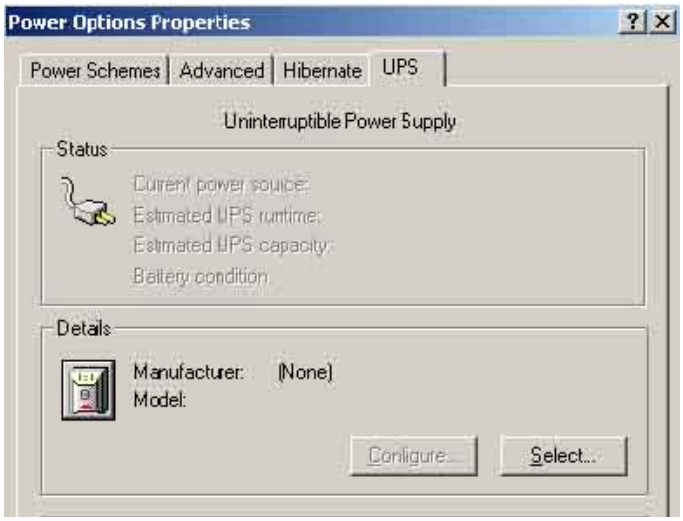
7.) Setting the UPS:

NOTICE For the System without the UPS, skip this UPS setting procedures. **(Do NOT perform UPS setting!!)**

a.) Select **Start > Settings > Control Panel.**

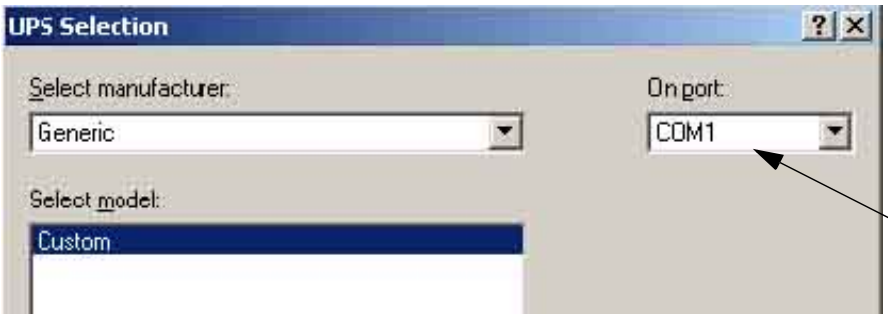
b.) Right-click on **Power Options.**

c.) The Power Options Properties window appears. Select **UPS > Select.**

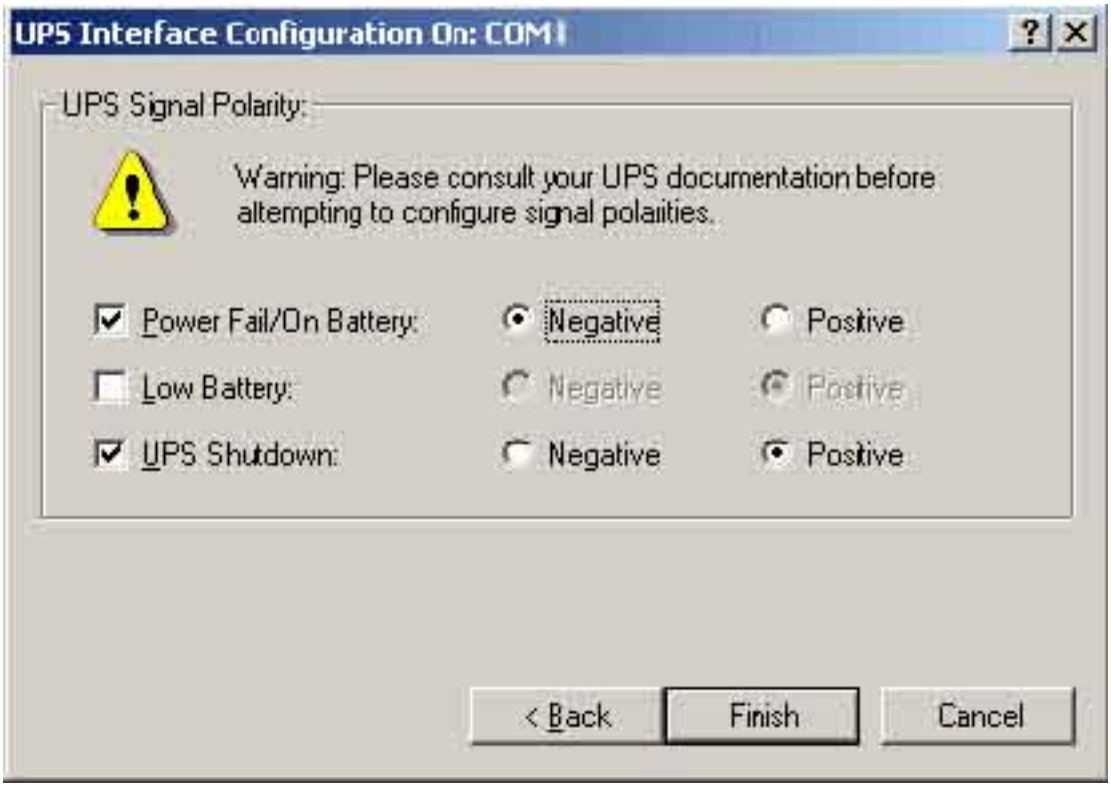


d.) Select **Generic**, then right-click on **Custom.**

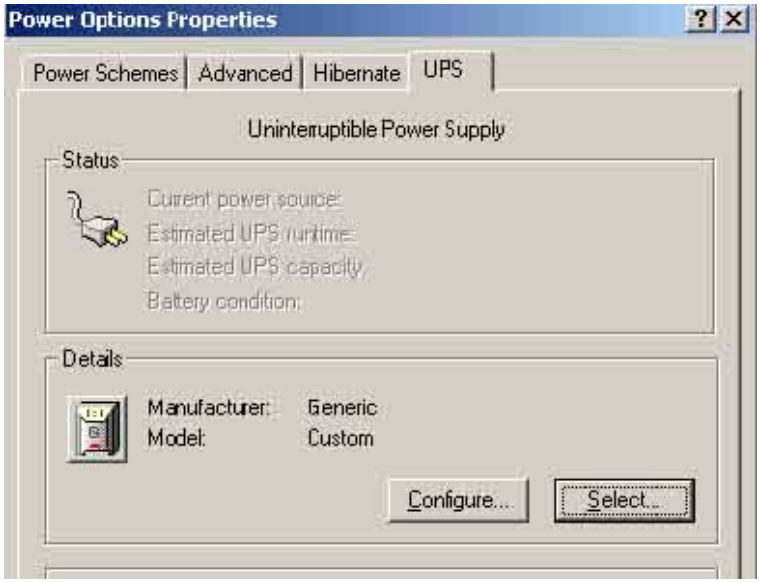
e.) Verify that **COM1** is properly selected as ON port. Right-click on **Next.**



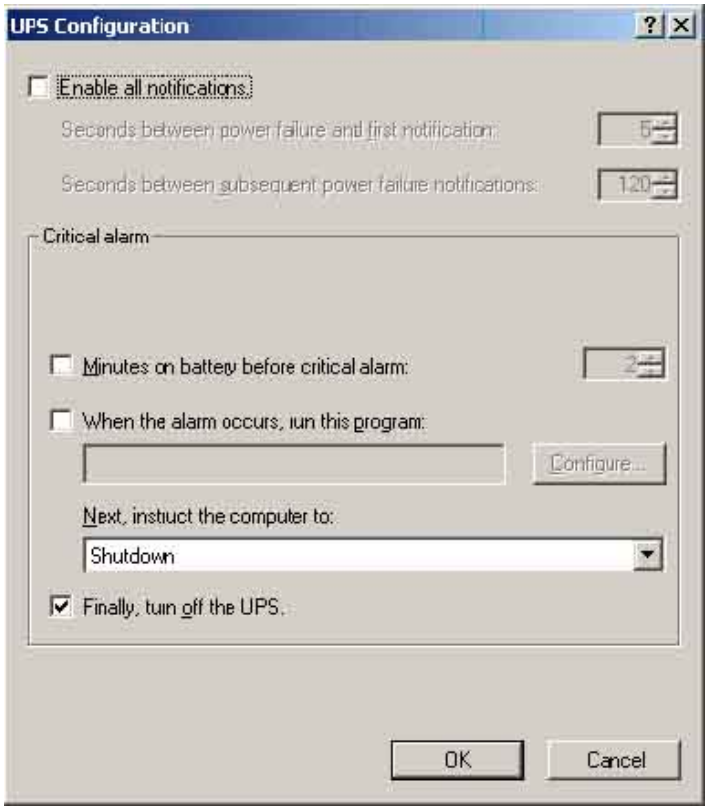
f.) The UPS Interface Configuration window appears. Select as follows, then right-click on **Finish.**



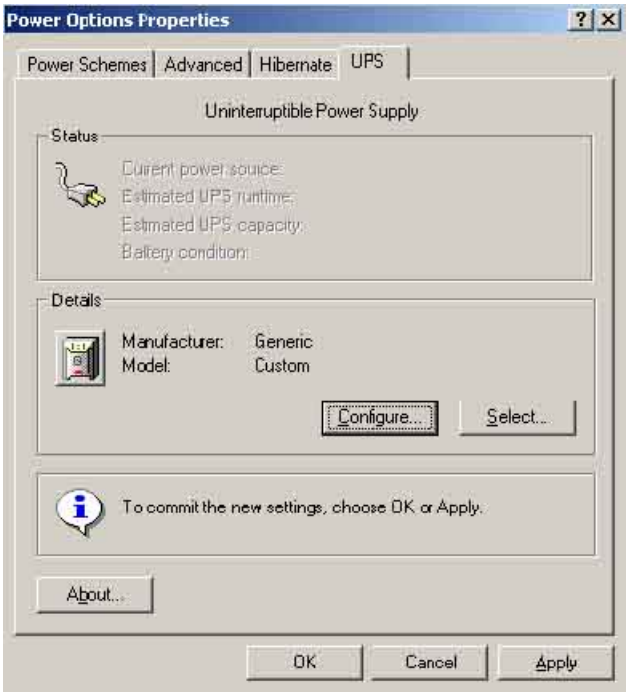
g.) Right-click on **Configure...**



h.) Select as follows, then right-click on **OK.**



i.) Right-click on **OK.**



j.) Wait for approx. 30 second, then verify that the system does not shut down.
If shut-down starts, check:

* The wrong item(s) is set at UPS Interface Configuration window.
* The cable between ATX power supply of the BECOMP Assy and mother board is disconnected.
* If UPS setting and cable connection are correct, perform **Base System Software Load Image installation** again.

k.) Close all windows.

8.) LAN Check:

a.) On the desktop, left-click on **My Network Places**, then right-click on **Properties...**

b.) Verify that two network icons appears. (If “Local Area Connection” icon does not appear, the hardware failure might occur.)

c.) Using the right trackball button, double-click on **Local Area Connection.**

* When the following window appears, it will be automatically closed later.

* When the following window appears, right-click on **Cancel.**

d.) Close all windows.

9.)

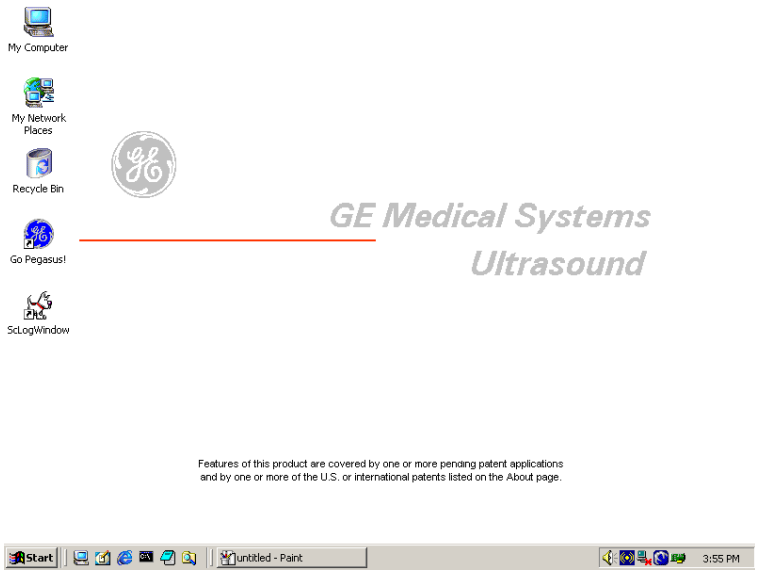
8-2-7 Installing R.3.x.x Application Software

8-2-7-1 Installing R.3.0.0 Application Software

1.) Power OFF the scanner.

2.) The SYSTEM-EXIT window appears. Click on **Shutdown...**

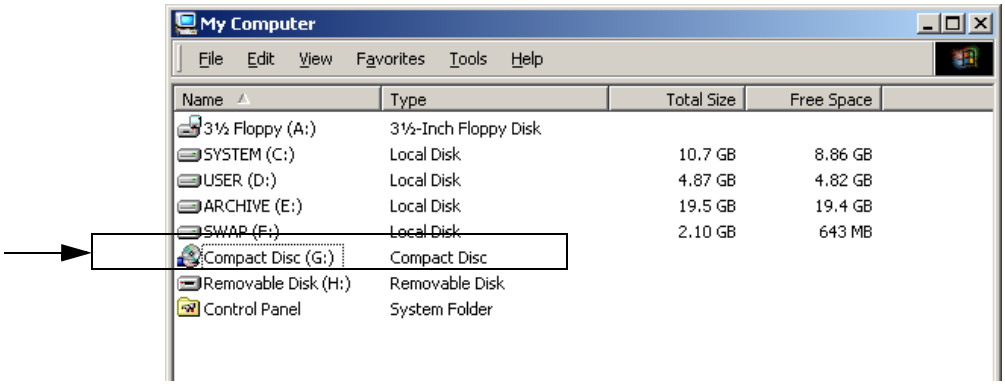
3.) Then, power ON the scanner. The windows2000 desktop appears.



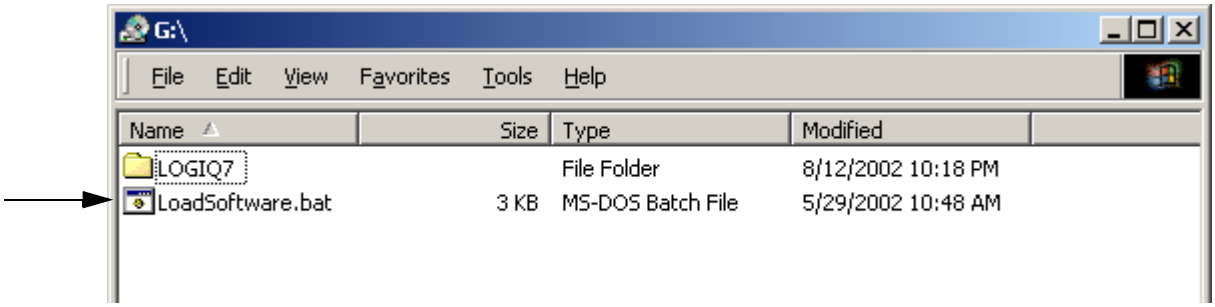
4.) Insert the Application Software CD-ROM into the CD-R or DVD drive.

⚠ **NOTICE** Wait approx. 20 seconds until the disk can be read.

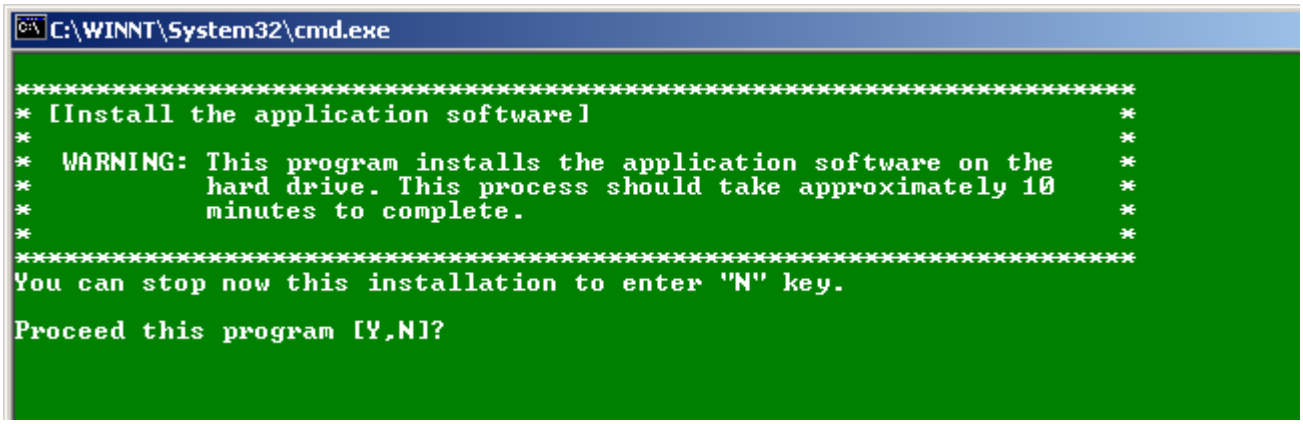
5.) Click on **My Computer**, then double-click on **Compact Disc (G:)** icon.



6.) Double-click on **LoadSoftware.bat.**



7.) The Installation program will start, and the command prompt screen will be shown on the monitor as shown.



8.) Press the **Y** key to continue.
Then the program requests confirmation (Are you sure?), press the **Y** key again.

NOTE: Press the N key to cancel this procedures and to power OFF the system.

NOTE: When the Information Window appears asking you to select OK, do nothing. This window will disappear automatically.

9.) The installation procedures will start automatically. It will take 5-10 minutes.

⚠ **NOTICE** **Do not operate with using mouse or keyboard during installation procedures!!!**

10.) After the installation procedures are completed, the system will power OFF automatically.

11.) Power ON the scanner and immediately press the EJECT button on the CD-R drive to eject the CD-ROM.

12.) Verify that the system boots up with no error. (It will take a few minutes.)

8-2-7-2 Standard Configurations and Functional Checks for LOGIQ7 Software

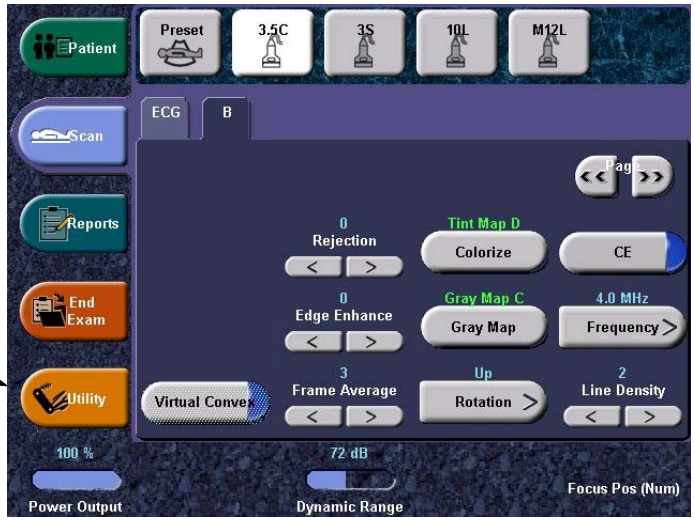
Configure the system settings and perform functional checks after installation of software.

Items for configuration and functional checks include:

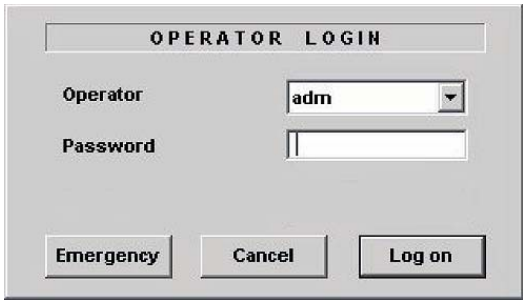
- Confirmation of the software version
- Functional Checks for ServicePlatform (Diagnostic Program)

Confirmation of the software version

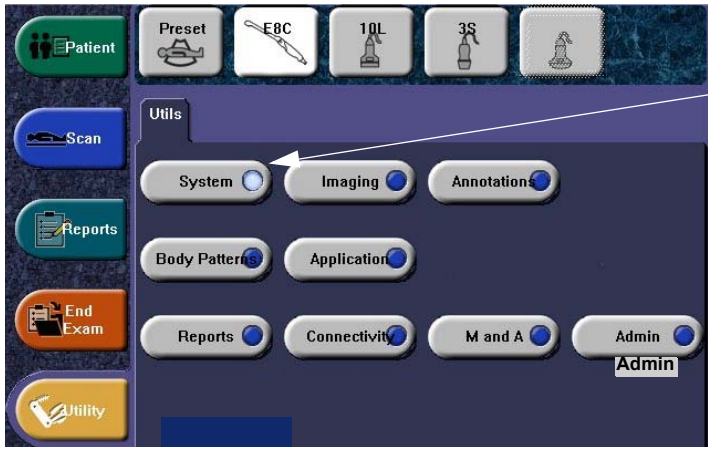
1.) Touch the **Utility** button on the Touch Panel.



*NOTE: The Operator Login window appears. Select **adm** (Administrator) for the Operator field. Adm (Administrator) will be shown in the Operator field as default. Enter the password which is configured already (or the password might not be necessary). Then click on **Log on**.*



2.) Touch the **System** button on the Touch Panel.



Press System button.

3.) Click on **About** tab. The software version will be shown on the monitor as shown. Confirm the following:

- Software Version (**R3.x.x**)
- Software Part Number (described on the Application CD-ROM)
- Image Part Number (described on the Base System Software Image CD-ROM)(

Base System Software CD-ROM Part Number

Click on the About tab

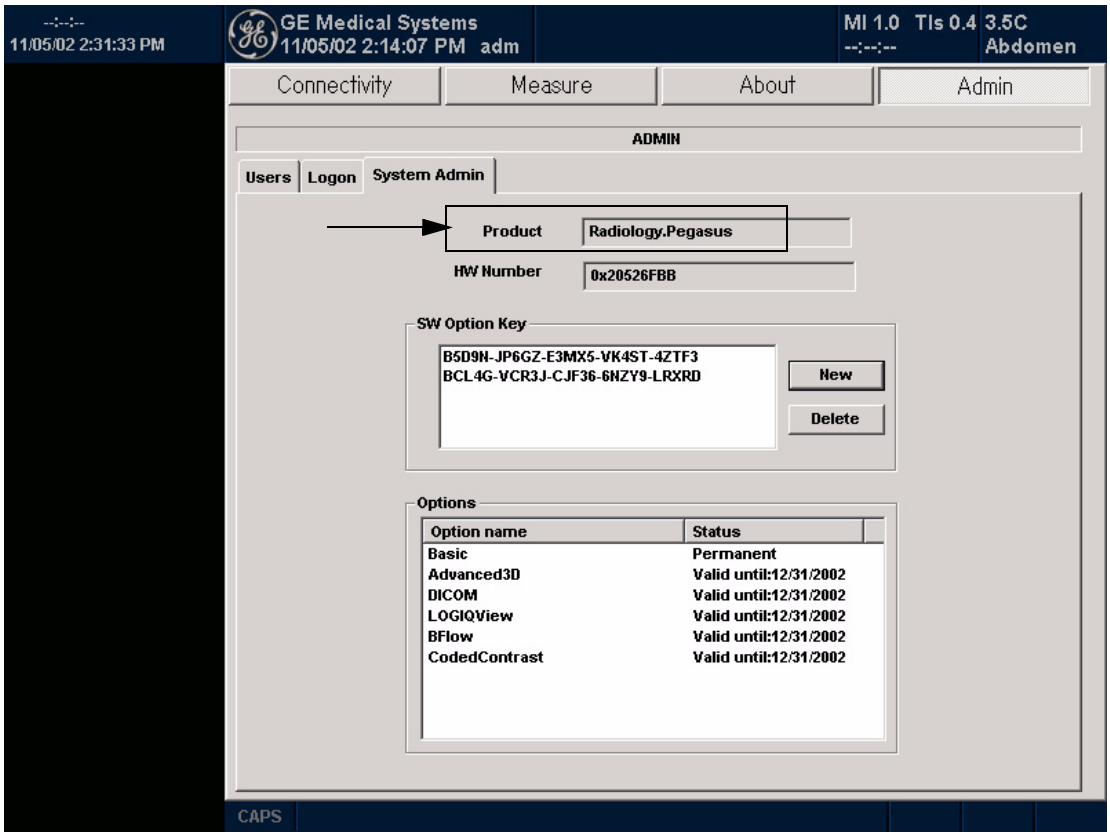
Application CD-ROM Part Number

Software Version

Software Option Check

1.) Touch **Utility > Admin.**

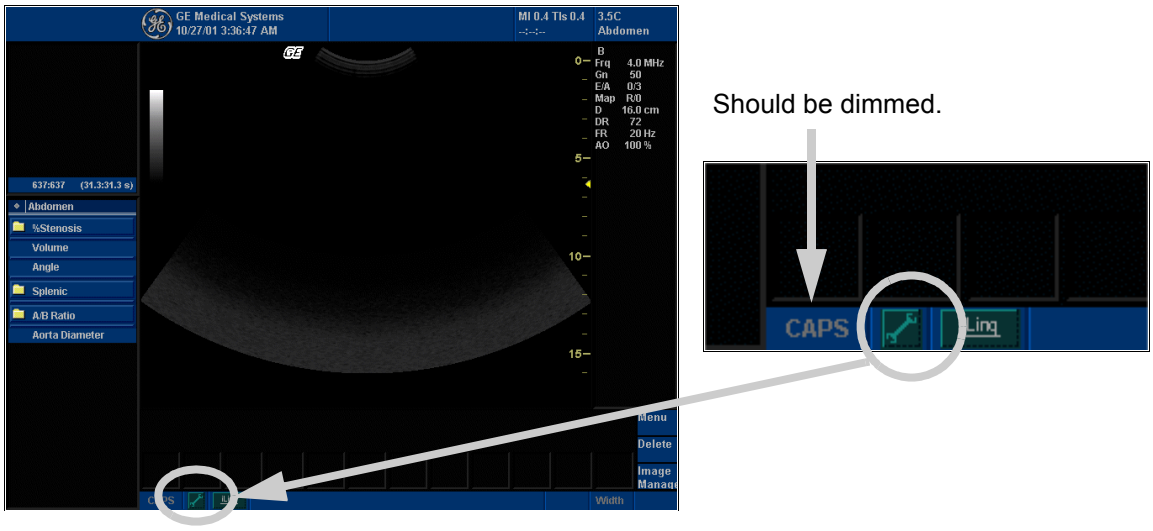
2.) Click on **System Admin** tab and verify that **HW Number** is the same as the Option Dongle ID that has been written at PC box replacement (Chapter 2)**.**



Functional Checks for Service Platform (Diagnostic Program)

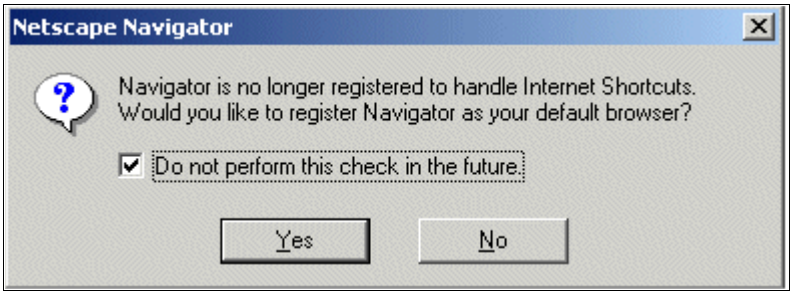
1.) Make sure that the wrench icon is shown at the bottom of the scan screen. Click on the wrench icon to activate. It will take about ten (10) seconds for activating.

2.) Make sure that **CAPS** is not selected (should be dimmed) for password entry performed later.



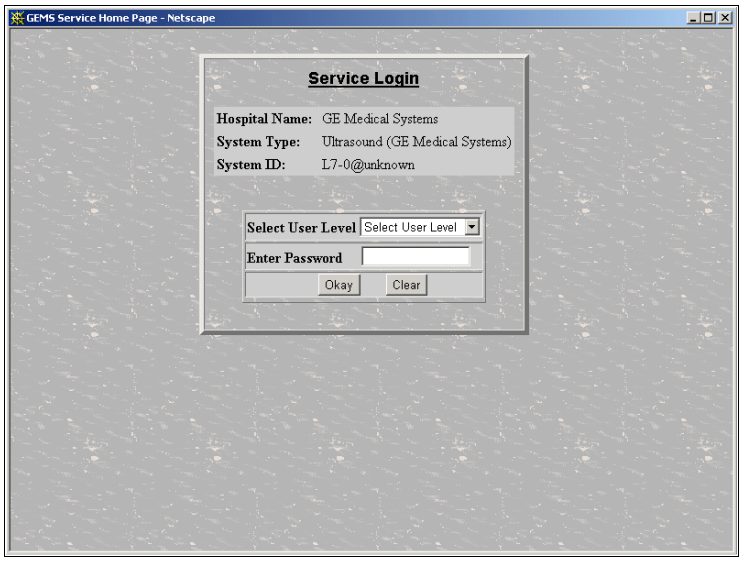
⚠ **CAUTION** **If the wrench icon is not displayed on the scan screen, the installation of Service Platform had been failed. Reload the application software. Contact a Technical Support for details.**

NOTE: If the following dialog box is shown on the monitor, select "Do not perform this check in the future" and click on the Yes button. This dialog box will not be displayed for next time.



*NOTE: If the following dialog box appears on the monitor, select **Start Communicator > insite** (displayed at the second line) **> Delete... > Don't Delete Directory.***

3.) The Service Login window for Service Platform will be shown on the monitor display.

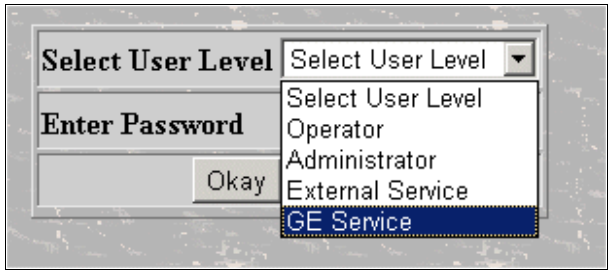


CAUTION **If the Login window for Service Platform is not displayed on the monitor, the installation of the Service Platform has failed. Reload the application software or Base System Software (OS) + application software. Contact a Technical Support for details.**

4.) Select **GE Service** at the “Select User Level” field.

5.) Enter the password for the Service Platform.

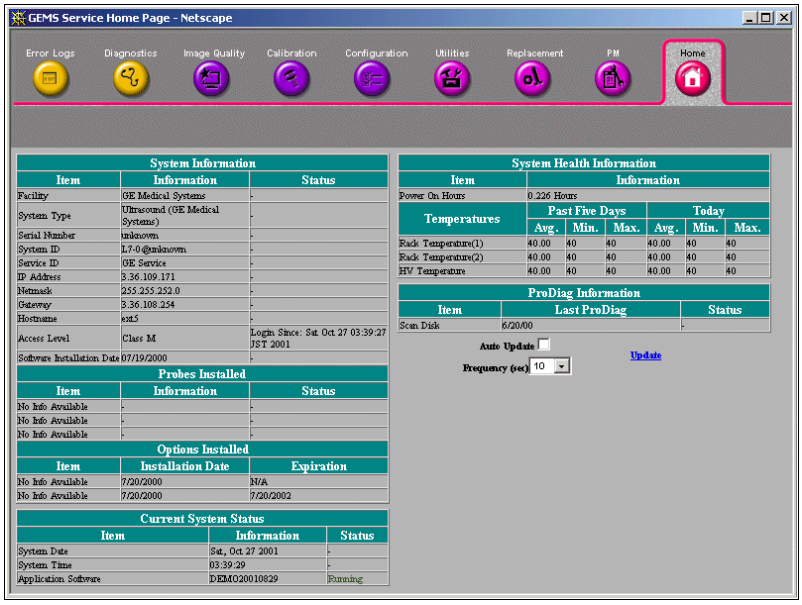
6.) Click on **Okay**.



7.) Verify that the following screen (Service Platform) is displayed on the monitor.

NOTICE When the service platform is NOT displayed, check if **CAPS** lock is selected. The **CAPS** should not be selected.

8.) Click on **x** located at the upper right corner of the service platform screen to close the Service Platform and return to the scan panel.



Setting the Computer Name

1.) Touch **Utility > Connectivity.**

2.) Click on **Tcpip.**

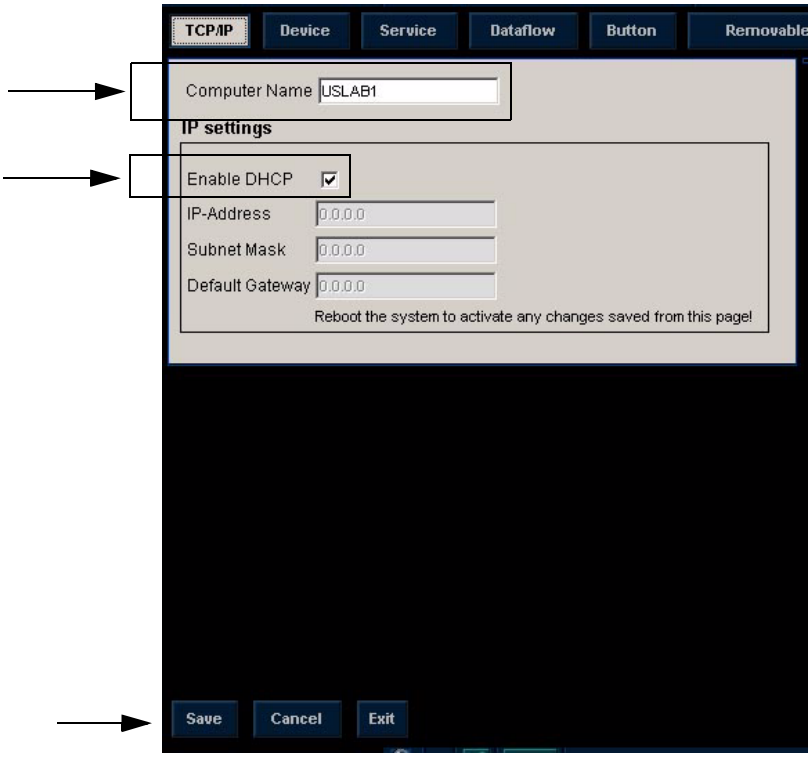
3.) Type **Computer Name.**

NOTICE The computer name is unique. Check the scanner serial Number printed on the label located at the rear lower side of the scanner. When 123456YM1 (for example) is printed, **L7-123456YM1** must be entered as a computer name.

4.) Verify that **Enable DHCP** has no check mark. If checked, remove the mark.

5.) Check if **Computer name, IP Address, Subnet Mask, and Default Gateway** are proper ones which you wrote down in section 8-2-5-3, Saving Connectivity.

6.) Click on **Save.**



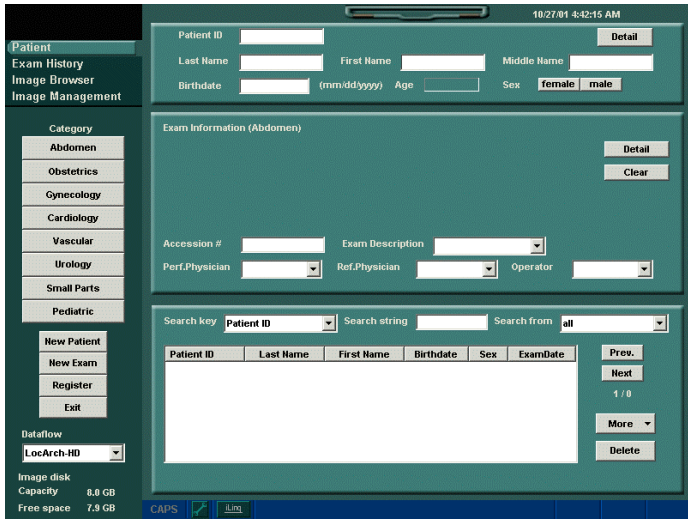
NOTICE If the “Save settings” is NOT performed, you can NOT enter the new patient screen!!

7.) Click on **OK** for confirmation dialog box.

8.) Touch **Scan** on the Touch Panel to return to the scan screen.

9.) Shut down the scanner.

10.) Power ON the scanner, then press **Patient** key and verify that the following screen appears.



Setting the VCR (if necessary)

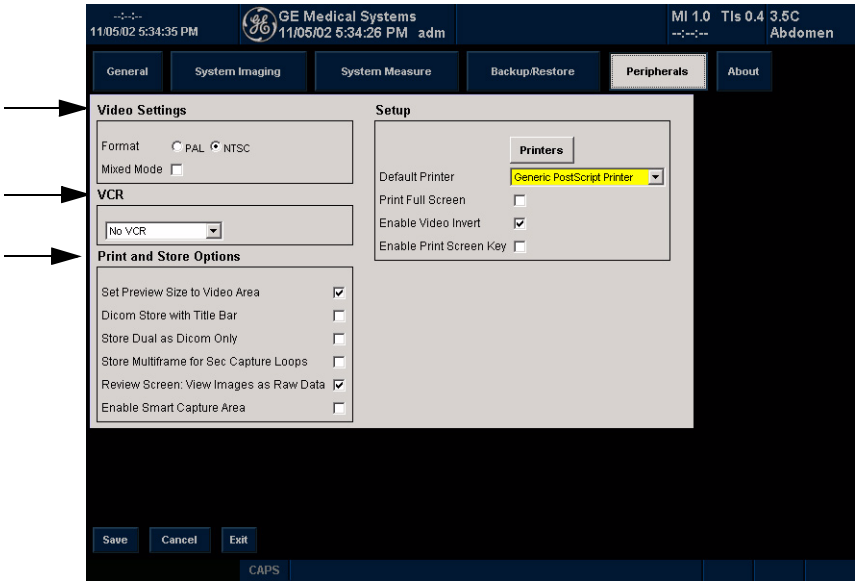
1.) Touch **Utility > System.**

2.) Click on **Peripheral** tab.

3.) Set the proper parameters:

- PAL or NTSC
- VCR type

4.) Click on **Save.**



5.) Shut down the scanner, then restart the scanner.

6.) Verify that the VCR can be properly operated (remote, play...) .

Functional Checks for Probe Recognition

1.) Touch **Scan** button on the Touch Panel to return to the scan screen.
2.) Connect each probe to ensure that they are recognized.
3.) Check every probe in the following modes and ensure that no artifacts or no problems are found in:
   - B-mode
   - Color FLow
   - Pulsed Doppler
   - M-mode
   - CW (option)
4.) Install the removed parts in the reverse order of removal.

Chapter 9
Renewal Parts

Section 9-1
Overview

9-1-1 Purpose of Chapter 9

This chapter gives you an overview of Renewal Parts for LOGIQ™ 7.

Table 9-1 Contents in Chapter 9

Section 9-2
List of Abbreviations

- Assy - Assembly
- Ctrl - Control
- FRU 1 - Replacement part available in part hub
- FRU 2 - Replacement part available from the manufacturer (lead time involved)
- Int - Internal
- I/O - Input/Output
- KB - Keyboard
- LCD - Liquid Crystal Display
- MON - Monitor
- PAT. - Patient
- PC - Personal Computer (Back End Processor)

Section 9-3
Renewal Parts List

9-3-1 Equipment Models Covered in this Chapter

Table 9-2 Material List

Part Name	Part Number	Quantity												Description
OPERATOR CONSOLE ASSY	2287317	1												100V, NTSC
OPERATOR CONSOLE ASSY	2304806		1			1								120V, NTSC
OPERATOR CONSOLE ASSY	2304807			1			1							220V, PAL
OPERATOR CONSOLE ASSY	2304808				1									220V, NTSC
OPERATION MANUAL	2286866-140	1												
OPERATION MANUAL	2286866-100		1	1	1									
ADV. REFERENCE MANUAL	2291860-140	1												
ADV. REFERENCE MANUAL	2291860-100		1	1	1									
SERVICE MANUAL	2286865		1	1	1									
QUICK GUIDE	2291859-140	1												
QUICK GUIDE	2291859-100			1	1									
WARRANTY CARD	P9889AH	1												
TASK LAMP	2301853-4	1	1	1	1									
Gel	U0403BD	1	1	1	1	1	1							
JAPAN (H76002, 2286864)														
USA (H44002LA, 2286864-2)														
EUROPE (H44002LB, 2286864-3)														
KOREA (H44002LC, 2286864-4)														
ASIA (H44002LD, 2286864-5)														
ASIA (H44002LE, 2286864-6)														

Table 9-3 Material List (For Style B/Ver.2)

Part Name	Part Number	Quantity											Description
OPERATOR CONSOLE ASSY	2354857	1											100V, NTSC
OPERATOR CONSOLE ASSY	2354858		1			1							120V, NTSC
OPERATOR CONSOLE ASSY	2354859			1			1						220V, PAL
OPERATOR CONSOLE ASSY	2354860				1								220V, NTSC
OPERATOR CONSOLE ASSY	2355589							1					100V, NTSC
OPERATION MANUAL	2286866-140	1						1					
OPERATION MANUAL	2286866-100			1	1	1	1						
ADV. REFERENCE MANUAL	2291860-140	1						1					
ADV. REFERENCE MANUAL	2291860-100			1	1	1	1						
SERVICE MANUAL	2286865			1	1	1	1						
QUICK GUIDE	2291859-140	1						1					
QUICK GUIDE	2291859-100			1	1	1	1						
WARRANTY CARD	P9889AH	1						1					
TASK LAMP	2301853-4	1	1	1	1								
Gel	U0403BD	1	1	1	1	1	1						
B-Flow	2297481	1						1					
Application Software CD (R.2.1.0) or	2362291	1	1	1	1	1	1	1					
Application Software CD (R.2.1.1) or	2372267	1	1	1	1	1	1	1					
Application Software CD (R.2.1.3)	2384238	1	1	1	1	1	1	1					

JAPAN (2354838)	
USA (2354838-2)	
EUROPE (2354838-3)	
KOREA (2354838-4)	
ASIA100 (2354838-5)	
ASIA220 (2354838-6)	JAPAN-A (2354838-7)

Table 9-4 Material List (For Style C/Ver.3)

Part Name	Part Number	Quantity											Description
OPERATOR CONSOLE ASSY	2389221	1											100V, NTSC
OPERATOR CONSOLE ASSY	2389220		1			1							120V, NTSC
OPERATOR CONSOLE ASSY	2389219			1			1						220V, PAL
OPERATOR CONSOLE ASSY	2389218				1								220V, NTSC
OPERATOR CONSOLE ASSY	2389217							1					100V, NTSC
OPERATION MANUAL	2286866-140	1						1					
OPERATION MANUAL	2286866-100			1	1	1	1						
ADV. REFERENCE MANUAL	2291860-140	1						1					
ADV. REFERENCE MANUAL	2291860-100			1	1	1	1						
SERVICE MANUAL	2286865		1	1	1	1	1						
QUICK GUIDE	2291859-140	1						1					
QUICK GUIDE	2291859-100			1	1	1	1						
WARRANTY CARD	P9889AH	1						1					
RELEASE NOTE	2382150-140	1						1					
RELEASE NOTE	2382150-100			1	1	1	1						
QUICK CARD	2318541-140	1						1					
QUICK CARD	2318541-100			1	1	1	1						
L7 HILIGHT DOCUMENT	2363423-140	1						1					
Application Software CD (R.3.0.0)	2389348	1	1	1	1	1	1	1					

JAPAN (2389216)	
USA (2389216-2)	
EUROPE (2389216-3)	
KOREA (2389216-4)	
ASIA100 (2389216-5)	
ASIA220 (2389216-6)	JAPAN-A (2389216-7)

9-3-2 Monitor

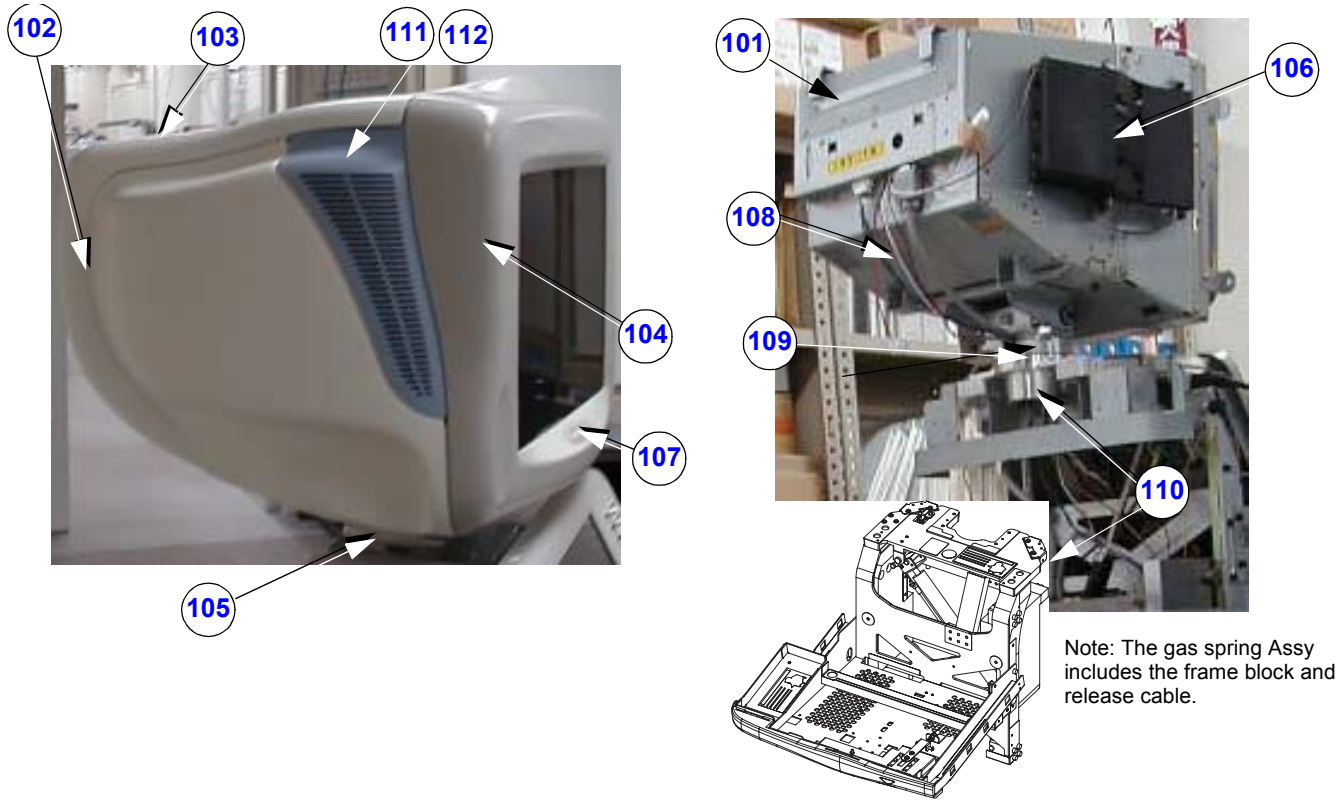


Figure 9-1 Monitor

Table 9-5 Monitor

Item	Part Name	Part Number	Description	Qty	FRU
101	CRT MONITOR ASSY	2283334-4	Monitor, not inclucing the following parts (102 ~ 112)	1	1
102	MON-REAR-WSP-ASSY	2303930	rear cover of monitor	1	2
103	MON-CAP-ASSY	2303932	cap to cover screws	1	2
104	MON-FRONT-ASSY	2303929	front cover of monitor	1	2
105	NECK ASSY	2284225	mechanical	1	2
106	SPEAKER & BRACKET ASSY	2386616 or 2297882	2386616 for R.3.xx or later software 2386616 for R.2.xx or lower software	2	2
107	USER SW ASSY OF MONITOR	2297050	microphone and switch	1	2
108	MON-CABLE-ASSY	2304171	cable	1	2
109	NECH-BASE-ASSY	2303933	mechanical	1	2
110	GAS-SPRING-ASSY	2304787	gas spring including release cable and mechanical	1	2
111	Grill, Left	2279675		1	2
112	Grill, Right	2279676		1	2

9-3-3 Casters and Pedals

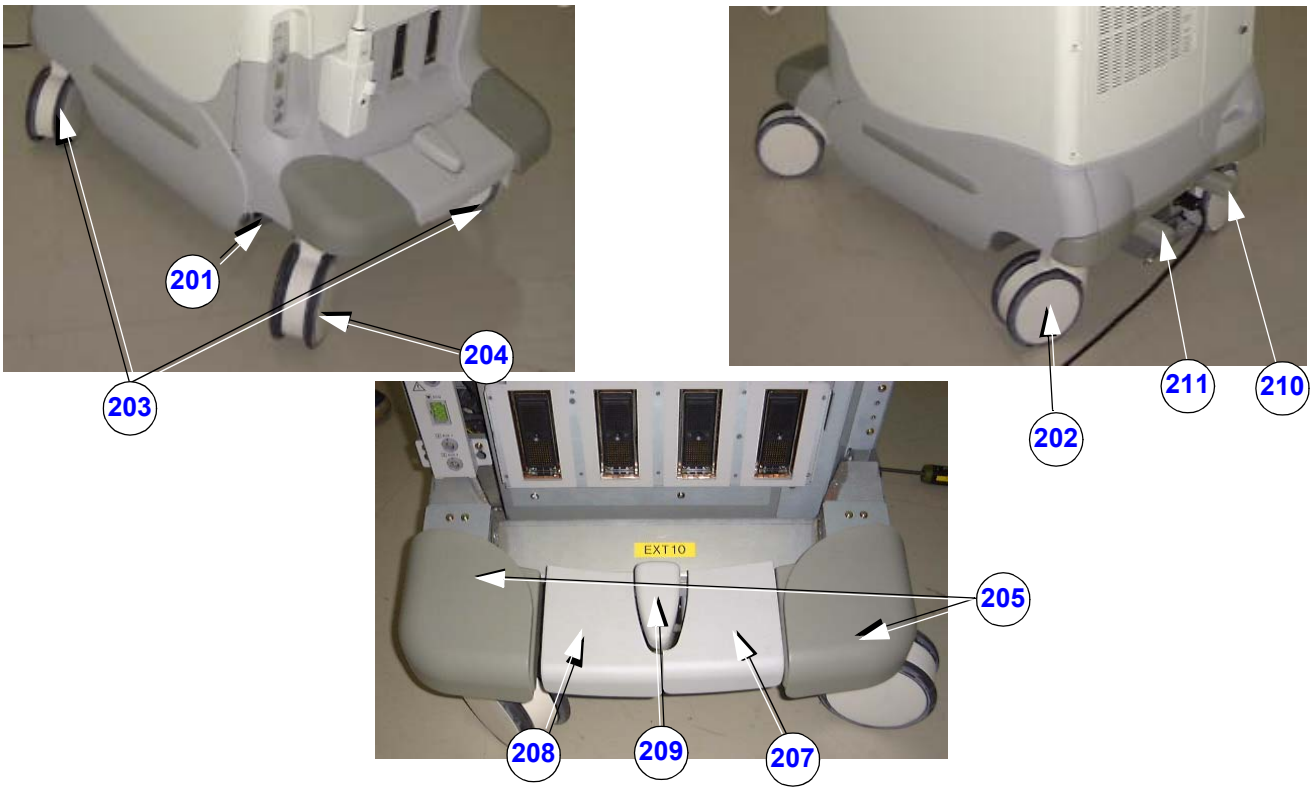


Figure 9-2 Casters and Pedals

Table 9-6 Casters and Pedals

Item	Part Name	Part Number	Description	Qty	FRU
201	CASTER LINK ASSY	2304800	entire brake mechanism	1	2
202	CASTER SWIVEL	2379964 or 2307311	swivel, rear right	1	2
203	CASTER LOCK	2379695 or 2307312	lock, front right and rear left	2	2
204	CASTER FREE	2379693 or 2307301	free, front left	1	2
205	FRONT-BUMPER-ASSY	2315419	front bumper, left and right	1	2
207	PEDAL-R	2291870	rubber pedal for brake caster lock	1	2
208	PEDAL-L	2291869	rubber pedal for brake caster lock	1	2
209	PEDAL CENTER	2291871	rubber pedal for brake caster lock	1	2
210	PEDAL-REAR-REL	2304908	rear pedal	1	2
211	PEDAL-REAR-SWL	2304909	rear pedal	1	2

NOTE:

The new type of the Caster already has been released. The differences between old and new types of the caster are the shape and attaching hardware as shown.

- If you replace a caster from the old type to the new one:
  Order **Caster FRU Assy (2381035; FRU2)**. This contains 4 casters (One Free Caster, One Swivel Lock Caster, and Two Total Lock Caster) and 16 attaching bolts. This mean that you must replace ALL of the four casters as an assembly when replacing a caster.

- If you replace a caster for the system with a new type of the caster installed:
  Order **Caster (2379693/Free, 2379964/Swivel Lock, or 2379695/Total Lock; FRU2).** This is only one caster (with no bolt).

9-3-4 Plastic Covers

Figure 9-3 OP Panel and Keys

9-3-4 Plastic Covers (cont'd)

Table 9-7 OP Panel and Keys

Item	Part Name	Part Numbers	Description	Qty	FRU
251	KB COVER LEFT	2282547	upper left cover of keyboard (under monitor)	1	2
252	KB COVER RIGHT	2282548	upper right cover of keyboard (under monitor)	1	2
253	COVER-TOP	2315418	top cover	1	2
254	KB COVER BOTTOM	2282546	plastic cover under keyboard	1	2
255	UP/DOWN-KNOB-ASSY	2304820	handle for keyboard up/down, wire	1	2
256	ECG CABLE HOOK	2283028	hook under keyboard	1	2
257	FRONT COVER TOP	2304765	upper cover around probe connector	1	2
258	FRONT COVER UNDER	2304766	lower cover around probe connector	1	2
259	SIDE COVER L ASSY	2304769	plastic cover, including bracket	1	2
260	SIDE COVER R ASSY	2304770	plastic cover, including bracket	1	2
261	SIDE-POCKET	2291872	cover of peripheral room with pocket	1	2
262	SIDE-FRINGE	2303896	cover of peripheral room without pocket	1	2
263	REAR COVER ASSY	2304767	plastic cover	1	2
264	REAR DOOR ASSY	2304768	door for peripherals connector, including latch	1	2
265	HANDLE	2309857	rear handle	1	2
266	REAR CONN ASSY	2304618	rear connector for peripherals	1	2
267	REAR CONN 220V ASSY	2304622	rear connector for peripherals	1	2
268	KB BUMPER	2283014	Operation panel bumper	1	2

9-3-5 Recording Devices

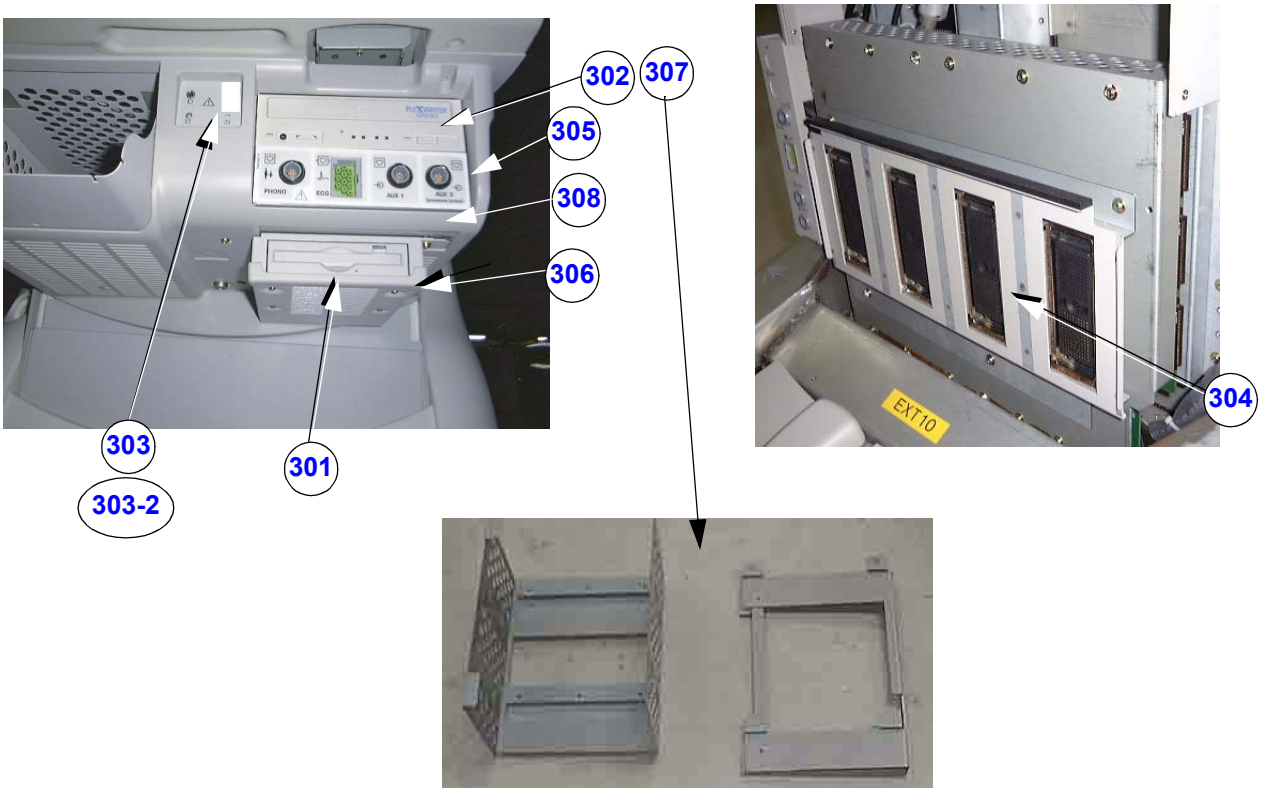


Figure 9-4 Recording Devices

Table 9-8 Recording Devices

Item	Part Name	Part Number	Description	Qty	FRU
301	MOD Option Kit	2355070 or 2307450	Either 2355070 (1.3GB drive) or 2307450 (230MB drive) are available.	1	1
302	CD-RW-SVC	2375462 (or 2304918)	cd-r/w drive 2375462 includes CD-RW, Ghost CD, and manual.	1	1
303	FRONT-IF-ASSY	2324098	front connector for peripherals	1	1
303-2	FRONT CONTROL ASSY	2302393	front connector for peripherals	1	2
304	QCON ASSY	2304617-3	PCON+PSEL+bracket	1	2
305	PAT. I/O	FA200801	for ecg	1	1
306	MOD Fixture Kit	2308066		1	2
307	DVD unit	2388429	For R.3.xx or later software ONLY If the system is upgraded from CD-RW to DVD, order DVD installation kit (2389332).	1	1
308	5 inch bay Assy	2389204	For installation of the DVD unit ONLY	1	1

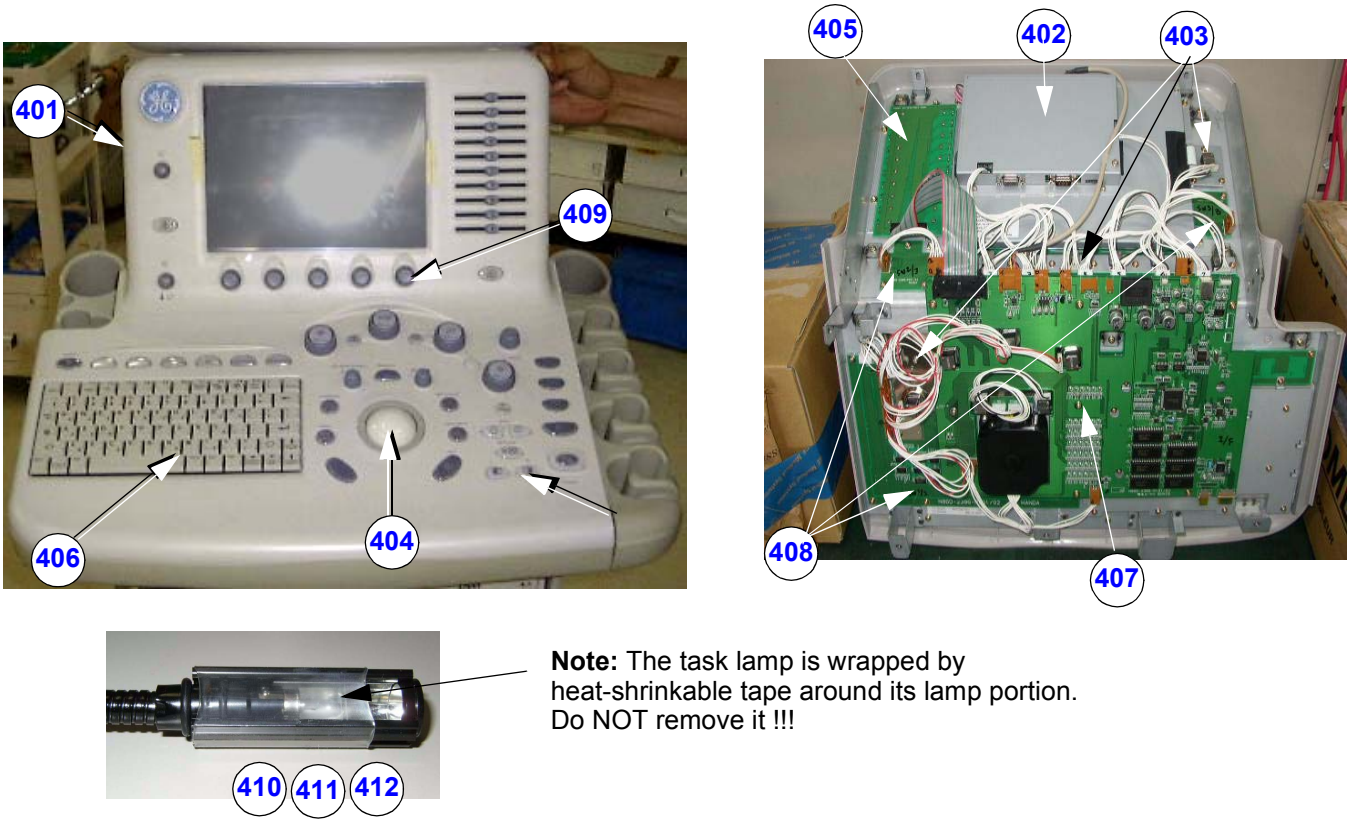
9-3-6 Probe Holder

Figure 9-5 Probe Holder

Table 9-9 Probe Holder

Item	Part Name	Part Number	Description	Qty	FRU
350	PROBE HOLDER R ASSY	2296738	rubber holder with bracket	1	2
351	PROBE HOLDER L1 ASSY	2296736	rubber holder with bracket	1	2
352	TV HOLDER ASSY	2296740	rubber holder for TV	1	2
353	GEL HOLDER R ASSY	2296741	includes bottom	1	2

9-3-7 OP Panel and Keys



Note: The task lamp is wrapped by heat-shrinkable tape around its lamp portion. Do NOT remove it !!!

Figure 9-6 OP Panel and Keys

Table 9-10 OP Panel and Keys

Item	Part Name	Part Number	Description	Qty	FRU
401	KEYBOARD ASSY	2344632-2	whole keyboard, this includes next 8 items	1	1
402	LCD UNIT	2369825	LCD touch panel, three cables, bracket metals	1	1
403	ROTARY ENCODER ASSY	2369826	Three rotary encoders with cables	1	1
404	TRACKBALL ASSY	2369823	trackball, two cables (w/o bracket)	1	1
405	TGC ASSY	2369822	TGC PCB Assy, bracket, cable (w/o TGC knobs)	1	1
406	A/N KBD ASSY	2369818	board of a/n key switch	1	1
407	I/F BOARD ASSY	2369817	I/F PCB ASSY, Mic cable, USB cable	1	1
408	SW BOARD ASSY	2369815	Three SW PCB Assy, rubber sheets, two cables	1	1
409	KEY ACCESSORY SET	2369816	A/N keytops, all encoder knobs, all clear key caps, labels (For knob repair, order 2363861 repair kit.)	1	2
410	TASK LAMP ASSY	2301853-4	task light	1	1
411	LAMP ASSY	2301857	fixture kit of task lamp	1	2
412	TASK LAMP KNOB	2304620	knob	1	2

9-3-8 Circuit Board Assemblies

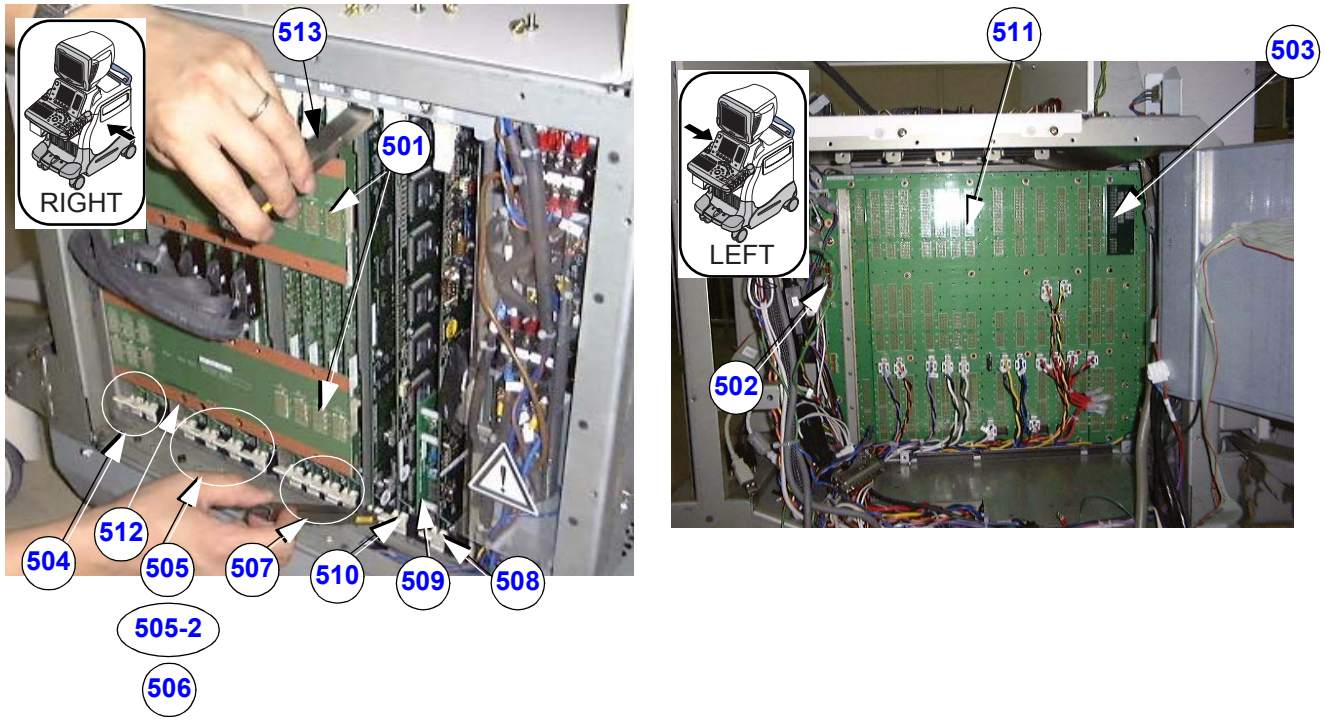


Figure 9-7 Circuit Board Assemblies

Table 9-11 OP Panel and Keys

Item	Part Name	Part Number	Description	Qty	FRU
501	EBUS ASSY	2271702-2	"-2 or later" board must be used for STCW Option.	2	1
502	MDCON ASSY	2273295	board in nest	1	1
503	TERMINATOR ASSY	2268026	board	1	2
504	PREA ASSY	2264596-2	board in nest, slot 1 - 2	1	1
505	TRAP ASSY	2264598	board in nest, slot 4 - 7	1	1
505-2	TRAP2 Assy	2323353-4	New TRAP board in nest slot 4- 7. When 2264598 TRAP is discontinued, order this TRAP2 Assy. However, for the board inserted into Slot 5 only, the TRAP2 Assy MUST be installed. If it is not, the STCW option can not be installed later.	1	1
506	TRAPCW ASSY	2323450-4	board in nest, slot 4 - 7	1	1
507	DDBF ASSY	2357804	board in nest, slot 8 - 11 Including DDBF Assy 2264600-4 and "-3" conversion kit (ROM + "-3" label + instructions)	1	1
508	SHINANO ASSY	2264602-3	board in nest, slot 12	1	1
509	PROMP ASSY	2264604-2	board in nest, slot 13 "-2 or later" must be used for STCW option.	1	1

Table 9-11 OP Panel and Keys

Item	Part Name	Part Number	Description	Qty	FRU
510	MDBRG ASSY	2264606-2	board in nest, slot 15 "-2 or later" must be used for 6T probe.	1	1
511	MOTHER ASSY	2264608-3	board	1	1
512	STCW ASSY	2277244-2	board in nest, slot 3 (option)	1	1
513	NEST Board JIG Assy	2315492	Tools to remove a board in the NEST Assy	1	2

9-3-9 HDD and Battery

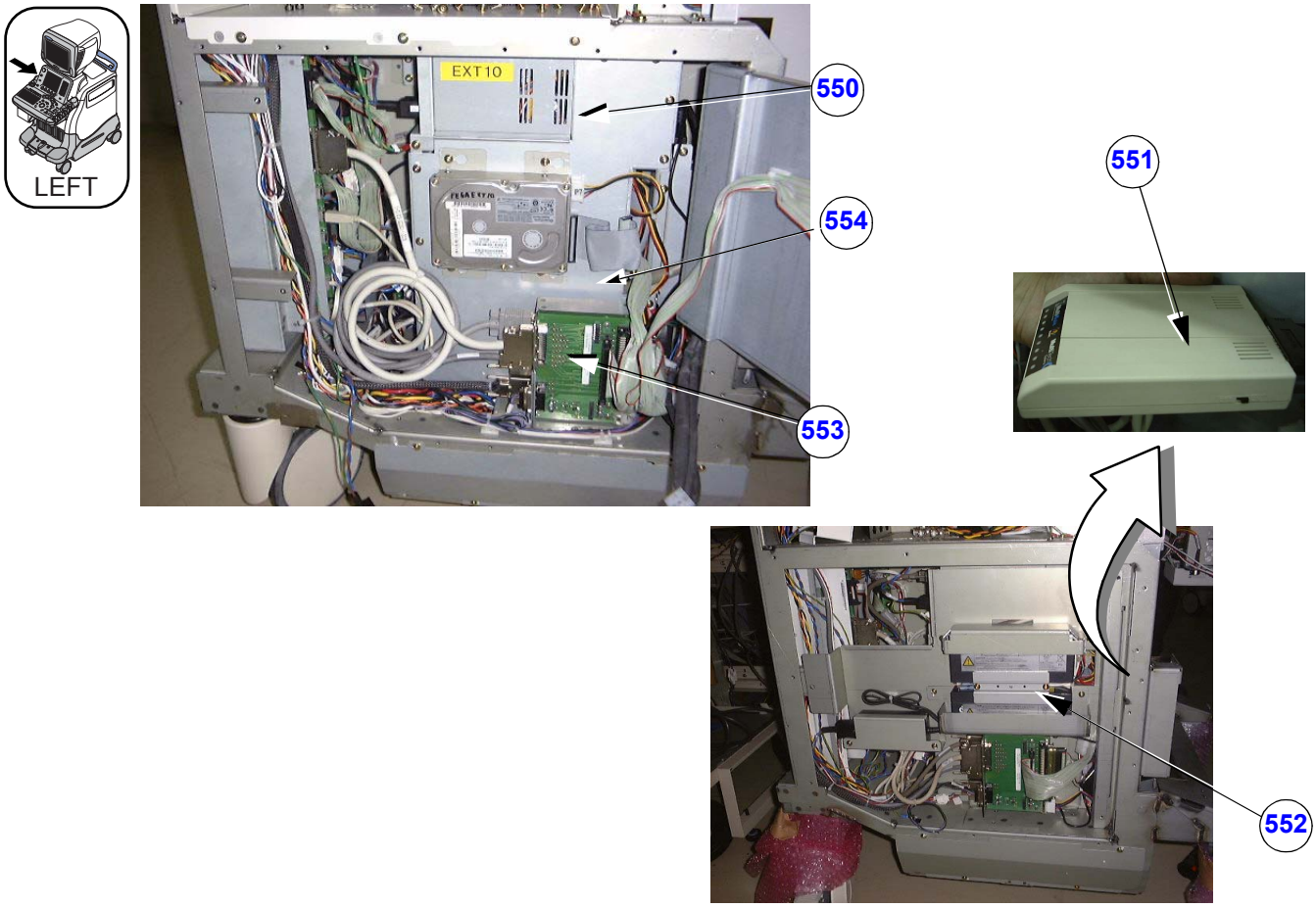


Figure 9-8 HDD and Battery

Table 9-12 HDD and Battery

Item	Part Name	Part Number	Description	Qty	FRU
550	BECOMPSW2-SVC	2384945	PC Box. Refer to the table below for proper selection.	1	1
551	GLOBAL MODEM KIT	2245794	global modem (Option)	1	1
552	UPS BATTERY PACK	2304809	battery of ATX power supply	1	1
553	DGPCIO/VIC2-SVC	2384944	Refer to the table below for proper selection.	1	1
554	EXTENDED MEMORY2	2373707	Included in the PC box. For R.3.xx or later software	-	2

Table 9-13 To select PC Box and VIC Assy

	DGPCIO/VIC2 (2372503)	DGPCIO/VIC (2352289)	PC2IO/VIC (2301854-2)
BECOMPSW2 (2351329-4)	OK	OK	OK
BECOMPSW2 (2351329-3 or lower)	OK	OK	OK
BECOMPSW (2316354-3)	**NG**	**NG**	OK

BECOMPSW2-SVC (2384945), including:					
	Part Name	**P/N**	**QTY**	**For current DGPCIO/VIC (2352289) or PC2IO/VIC (2301854-2)**	**For new DGPCIO/VIC2 (2372503)**
1	BECOMPSW2 Assy (PC Box 2351328-2 + Ghost CD)	2351329-4	1	**Used**	**Used**
2	SV PCVIC Bracket - U	2379774	1	**Used**	Not used
3	SV PCVIC Bracket - L	2379773	1	**Used**	Not used
4	Screw	N9408HR	8	**Used**	**4 screws Used**
5	DGVIC connector label	2354667	1	**Used**	Not used
6	Velcro tape	U0032BA	30 cm	**Used**	Not used
7	Heat shrinkable tube	2357134	40 cm	**Used**	Not used
8	Tie-wrap	U0212AC	2	**Used**	Not used

DGPCIO/VIC2-SVC (2384944), including:					
	Part Name	**P/N**	**QTY**	**For current PC Box (2351328 or 2299702-xx)**	**For new PC Box (2351328-2)**
1	DGPCIO/VIC2 Assy	2372503	1	**Used**	**Used**
2	SV DGVIC bracket	2379772	1	**Used**	Not used
3	Screw	N9408HR	8	**Used**	**4 screws Used**
4	DGVIC connector label	2354667	1	**Used**	Not used
5	Velcro tape	U0032BA	30 cm	Not used	**Used**

9-3-10 Power Units

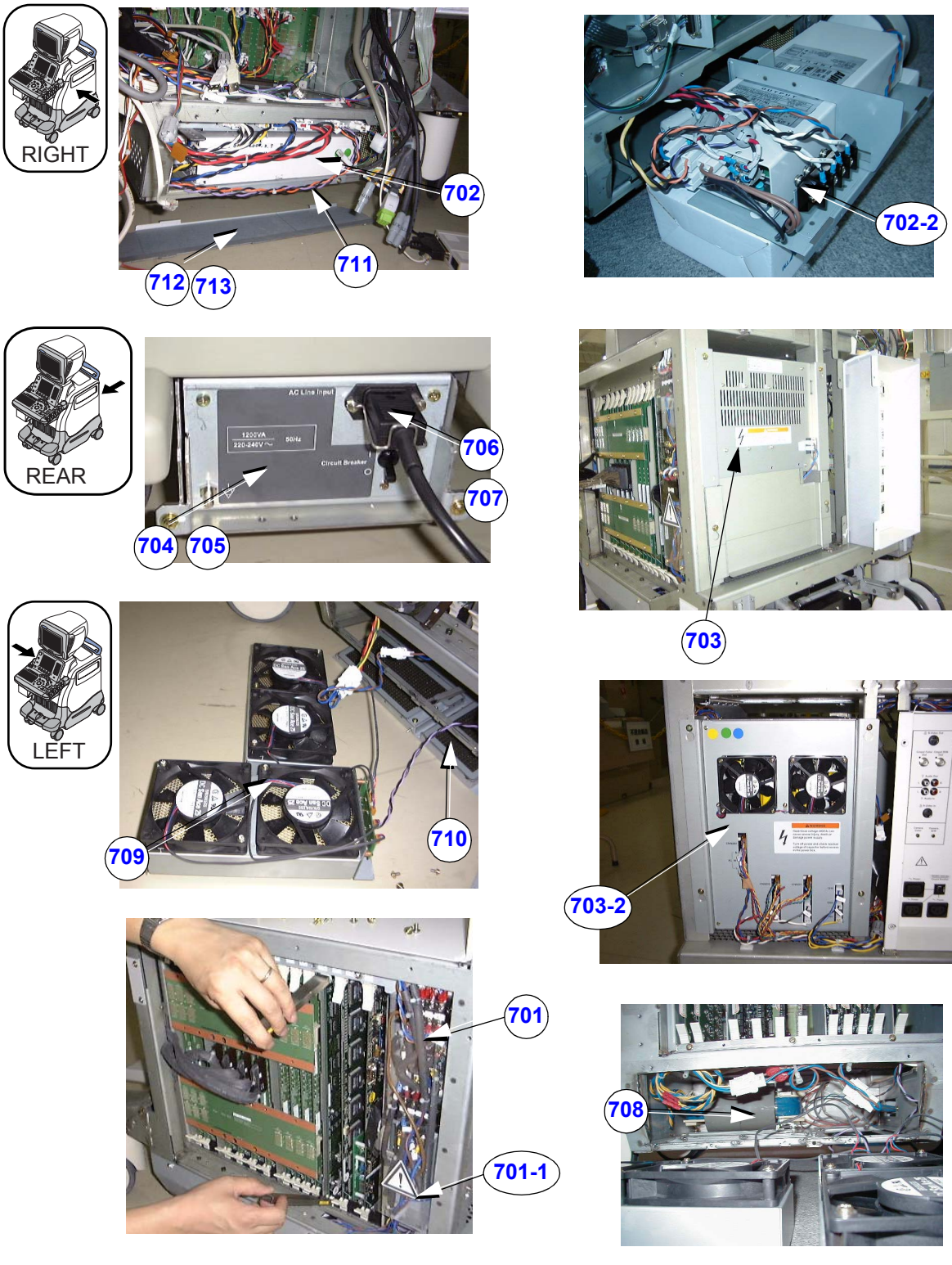


Figure 9-9 Power Units

9-3-10 Power Units (cont'd)

Table 9-14 Power Units

Item	Part Name	Part Number	Description	Qty	FRU
701	SSR PANEL	2292209	including 2 SSRs and fuse	1	1
701-1	FUSE	2315585	F1, 200V, T12A	1	1
702	LV UNIT	2283531	low voltage regulator	1	1
702-2	LV2 UNIT	2334197	low voltage regulator	1	1
703	HV UNIT	2372387	high voltage regulator (Half height), including materials used when changing Full height HV unit to the Half height.	1	1
703-2	HV UNIT	2283532-3	high voltage regulator (Full height)	1	1
704	AC POWER BOX	2292208-3	inlet unit for 100V	1	2
705	AC POWER BOX 220V	2304538-3	inlet unit for 220V	1	2
706	AC CORD 100V	2304819-3	power cable of 100V	1	2
707	AC CORD 220V	2304818-3	power cable of 220V	1	2
708	MAIN TRANS	2283530	power trans	1	2
709	CONSOLE FAN ASSY	2304624	4 fans	1	2
710	BOTTOM AIR FILTER	2304172	air filter for console	1	2
711	LV FILTER	2291083	air filter for LV unit	1	2
712	MF SIDER COVER R	2284345	side cover of power supply	1	2
713	MF SIDE COVER L	2284346	side cover of power supply	1	2

9-3-11 Options, Peripherals and Cables

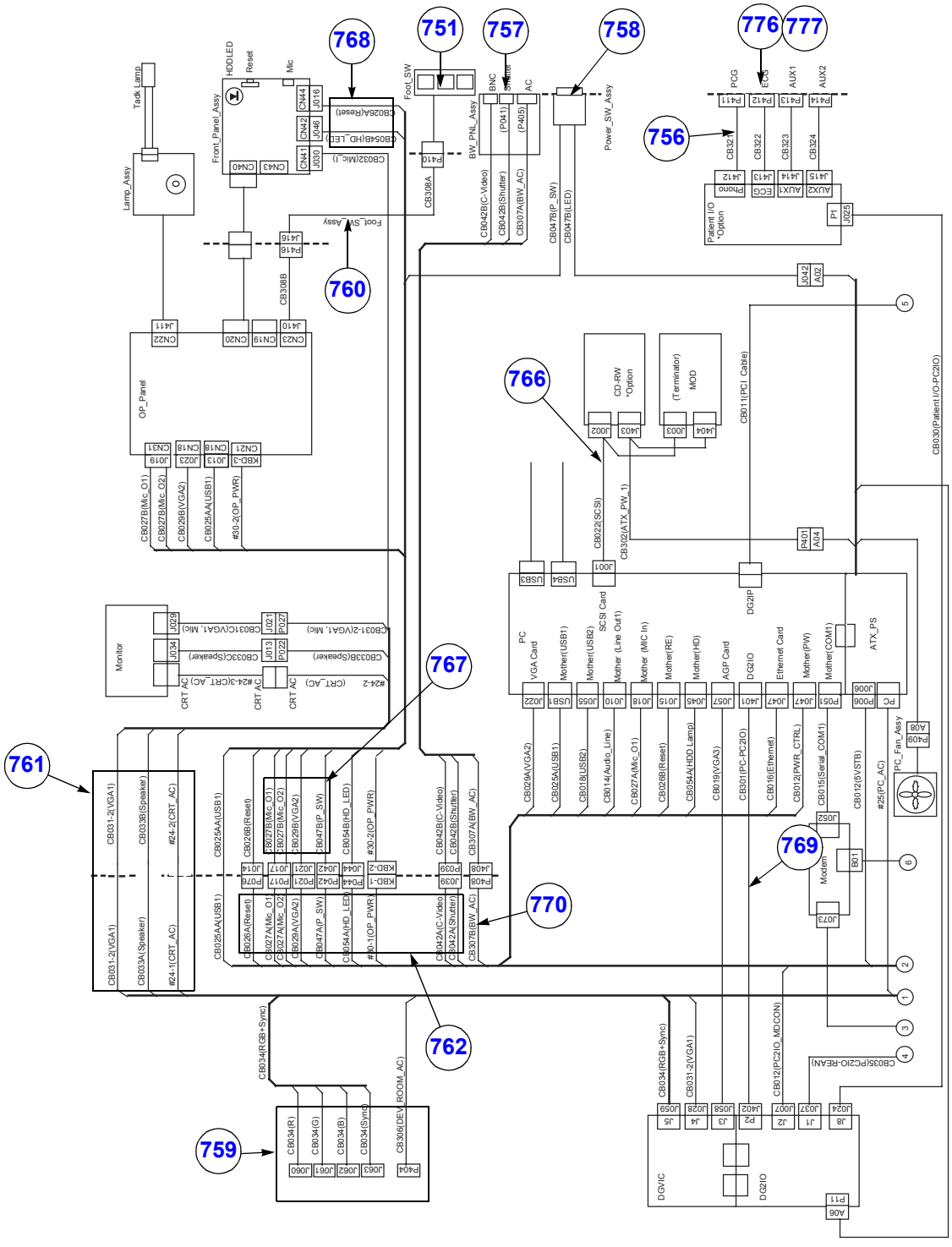


Figure 9-10 Options, Peripherals and Cables 1

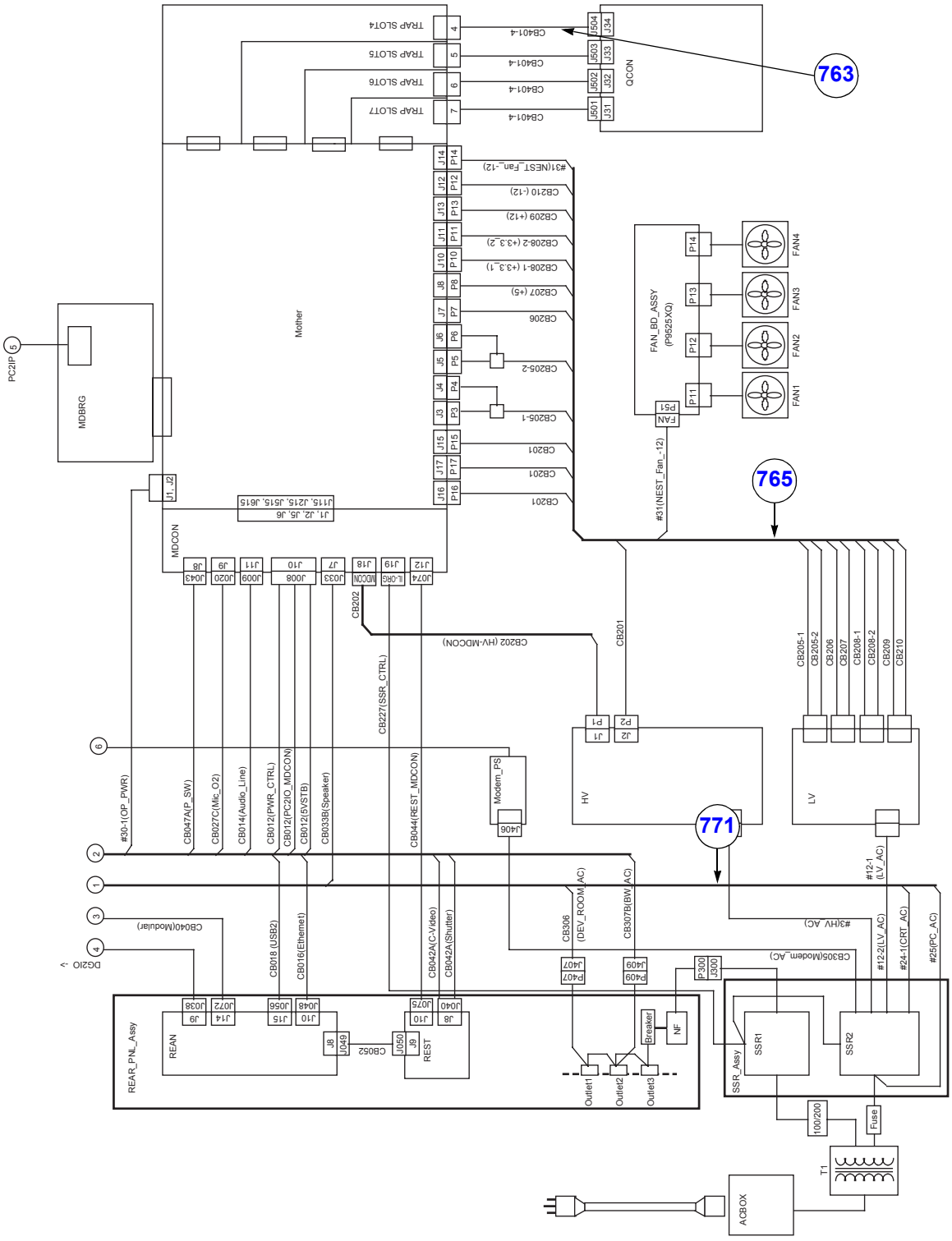


Figure 9-11 Options, Peripherals and Cables 2

Table 9-15 Options, Peripherals and Cables

Item	Part Name	Part Number	Description	Qty	FRU
751	FOOT SWITCH	FB200952	tool	1	2
756	PCG Option	2326844	phono microphone	1	1
757	BW PNL ASSY	2354668	front panel of B/W printer for OC 235xxxx	1	2
757	BW PNL ASSY	2301856	front panel of B/W printer for OC 22xxxxxx or 230xxxx	1	2
758	PW SW ASSY	2301858	power switch	1	2
759	DEV ROOM ASSY	2354669	AC & shutter panel in device room for OC 235xxxx	1	2
759	DEV ROOM ASSY	2301859	AC & shutter panel in device room for OC 22xxxxxx or 230xxxx	1	2
760	FSW CONN ASSY	2301860	front panel for foot switch	1	2
761	MONITOR VGA CABLE ASSY	2364955	for OC 235xxxx, including cable, tie-wrap, and screws.	1	2
761	MONITOR VGA CABLE2 ASSY	2359765	for OC 235xxxx	1	2
761	MONITOR VGA CABLE ASSY	2298144	2333352 + 2333877 for OC 22xxxxxx or 230xxxx	1	2
762	OP2 CABLE ASSY	2359766	for OC 235xxxx	1	2
762	OP CABLE ASSY	2298145	for OC 22xxxxxx or 230xxxx	1	2
763	TX CABLE ASSY	2305111		1	2
764	PC CABLE2 ASSY	2358656	for OC 235xxxx	1	2
764	PC CABLE ASSY	2298147	for OC 22xxxxxx or 230xxxx	1	2
765	POWER CABLE ASSY	2359541	for OC 235xxxx	1	2
765	POWER CABLE ASSY	2298148	for OC 22xxxxxx or 230xxxx	1	2
766	BAY CABLE ASSY	2301989		1	2
767	OP2 CABLE2 ASSY	2359767	for OC 235xxxx	1	2
767	OP CABLE2 ASSY	2302191	for OC 22xxxxxx or 230xxxx	1	2
768	OP CABLE3 ASSY	2304610		1	2
769	PC2IO/ IPCABLE ASSY	2304611	for OC 22xxxxxx or 230xxxx	1	2
770	SYS AC CABLE ASSY	2304612		1	2
771	PWR AC CABLE ASSY	2304613		1	2
772	PC BOX INTERNAL CABLE ASSY	2304797	for OC 235xxxx	1	2
-	USB CABLE	2358659		1	2

Table 9-15 Options, Peripherals and Cables

Item	Part Name	Part Number	Description	Qty	FRU
-	USB CABLE FOR PERIPHERAL DEVICE	2324360		1	2
-	USB DEV CABLE FOR PERIPHERAL DEVICE	2388600	DVD unit - PC Box	1	1
773	USB SERIALBRIDGE CBL	2304621		1	2
774	RS-232C CABLE ASSY STRAIGHT	2305549		1	2
775	RS-232C CABLE ASSY CROSS	2305550-2		1	2
776	ECG CBL SHORT	2304616		1	2
777	ECG CBL LONG	2304615		1	2
778	ECG INT CABLE ASSY	2315751		1	2
-	Keyboard Knob Repair kit	2363861		1	2

9-3-12 Probes

9-3-12-1 Probes for Export

Table 9-16 Probes for Export

Item	Part Name	Part Number	Description	Qty	FRU
801	3C PROBE (EXP)	2286354			1
802	3.5C PROBE (EXP)	2296158			1
803	5C PROBE (EXP)	2294516			1
804	M7CMIH PROBE (EXP)	2294514			1
805	E8C PROBE (EXP)	2294641			1
806	7L PROBE (EXP)	2294521			1
807	10L PROBE (EXP)	2294523			1
808	M12LMIH PROBE (EXP)	2294511			1
809	3S PROBE (EXP)	2323337			1
810	10S PROBE (EXP)	2298589			1
811	I12L PROBE (EXP)	2264883			1
812	P2D PROBE (EXP)	TE100024	PPA adapter 2331934 is separately required.		1
813	P6D PROBE (EXP)	TQ100002	PPA adapter 2331934 is separately required.		1
814	8C PROBE (EXP)	2348094			1
815	3.5CS PROBE (EXP)	2051858			1
816	6T TEE PROBE (EXP)	KN100068			1
817	M3S PROBE (EXP)	2295649			1

9-3-12-2 Probes for Japan

Table 9-17 Probes for Japan

Item	Part Name	Part Number	Description	Qty	FRU
851	3C PROBE (JPN)	2286353			1
852	3.5C PROBE (JPN)	2348877			1
853	5C PROBE (JPN)	2294515			1
854	M7CMIH PROBE (JPN)	2294513			1
855	E8C PROBE (JPN)	2294640			1
856	7L PROBE (JPN)	2294520			1
857	10L PROBE (JPN)	2294522			1
858	M12LMIH PROBE (JPN)	2294510			1
859	3S PROBE (JPN)	2348878			1
860	10S PROBE (JPN)	2309478			1
861	I12L PROBE (JPN)	2270556			1
862	8C PROBE	2348093			1
863	3.5CS PROBE	2380854			1
864	6T TEE PROBE	2294534			1
865	M3S PROBE	2293726			1

Chapter 10
Periodic Maintenance

Section 10-1
Overview

10-1-1 Purpose of Chapter 10

This chapter describes Periodic Maintenance (PM) on the scanner and its peripherals. These PM procedures are intended to maintain the quality of the ultrasound systems performance. Read this chapter completely and familiarize yourself with the procedures before starting a PM.

CONTENTS IN CHAPTER 10

Table 10-1 Contents in Chapter 10

CAUTION **Practice good ESD prevention. Wear an anti–static strap when handling electronic parts and even when disconnecting/connecting cables.**

DANGER **THERE ARE SEVERAL PLACES ON THE BACKPLANE, THE AC DISTRIBUTION, AND DC DISTRIBUTION THAT ARE DANGEROUS. BE SURE TO DISCONNECT THE SYSTEM POWER PLUG AND OPEN THE MAIN CIRCUIT BREAKER BEFORE YOU REMOVE ANY PARTS. BE CAUTIOUS WHENEVER POWER IS STILL ON AND COVERS ARE REMOVED.**

CAUTION **Do not pull out or insert circuit boards while power is ON.**

CAUTION **Do not operate this unit unless all board covers and frame panels are securely in place. System performance and cooling require this.**

CAUTION

Section 10-2
Why do Periodic Maintenance

10-2-1 Keeping Records

It is good business practice that ultrasound facilities maintain records of periodic and corrective maintenance. The Ultrasound Periodic Maintenance Inspection Certificate provides the customer with documentation that the ultrasound scanner is maintained on a periodic basis.

A copy of the Ultrasound Periodic Maintenance Inspection Certificate should be kept in the same room or near the scanner.

10-2-2 Quality Assurance

In order to gain accreditation from organizations such as the American College of Radiology (USA), it is the customer's responsibility to have a quality assurance program in place for each scanner. The program must be directed by a medical physicists, the supervising radiologist/physician or appropriate designee.

Routine quality control testing must occur regularly. The same tests are performed during each period so that changes can be monitored over time and effective corrective action can be taken.

Testing results, corrective action and the effects of corrective action must be documented and maintained on the site.

Your GE service representative can help you with establishing, performing and maintaining records for a quality assurance program.

Section 10-3
Periodic Maintenance Schedule

10-3-1 How often should PMs be performed?

The Periodic Maintenance Schedule specifies how often your LOGIQ™ 7 should be serviced and what items need attention. It is important you have your LOGIQ™ 7 serviced as scheduled in order to retain its high level of safety, dependability and performance.

Your GE Service Representative knows your LOGIQ™ 7 best and can provide competent, efficient service. Please contact us for further information and to schedule GE Medical Systems Ultrasound to perform this service for you.

The services and intervals shown in the maintenance schedule assumes that you use your LOGIQ™ 7 for an average patient load (10-12 per day) and not used as a primary "mobile unit".

10-3-1How often should PMs be performed? (cont'd)

Table 10-2 Periodic Maintenance Schedule

Service at Indicated Time	Daily	Weekly	Monthly	Annually	Notes
Clean Probes	•*				* or before each use
Clean Probe Holders	•				
Clean Air Filter		•			more frequently depending on your environment
Inspect AC Mains Cable			•		Mobile Unit Check Weekly
Inspect Cables and Connectors			•		
Clean Console			•		
Clean Monitor and Touch Panel			•		
Inspect Wheels, Casters, brakes and Swivel Locks			•		Mobile Unit Check Daily
Check Control Panel Movement			•		Mobile Unit Check Daily
Console Leakage Current Checks				•	also after corrective maintenance or as required by your facilities QA program
Peripheral Leakage Current Checks				•	also after corrective maintenance or as required by your facilities QA program
Surface Probe Leakage Current Checks				•	also after corrective maintenance or as required by your facilities QA program
Endocavity Probe Leakage Current Checks					**Twice Annually**
Transesphongeal Probe Leakage Current Checks					**As Prescribed in probe manual**
Surgical Probe Leakage Current Checks					**As Prescribed in probe manual**
Measurement Accuracy Checks				•	also after corrective maintenance or as required by your facilities QA program
Probe/Phantom Checks				•	also after corrective maintenance or as required by your facilities QA program

Section 10-4
Tools Required

10-4-1 Special Tools, Supplies and Equipment

10-4-1-1 Specific Requirements for Periodic Maintenance

See Chapter 7

Table 10-3 Overview of Requirements for Periodic Maintenance

Tool	Part Number	Comments
Digital Volt Meter (DVM)		
Electric Safety Analyzer DALE 600	46-285652G1	For 120V Unit
Electric Safety Analyzer DALE 600E	46-328406G2	For 220V Units
Leakage Current Ultrasound Kit	2113015	For 120V and 220V Units
Anti Static Kit	46–194427P231 46–194427P279 46–194427P369 46–194427P373 46–194427P370	Kit includes anti–static mat, wrist strap and cables for 200 to 240 V system 3M #2204 Large adjustable wrist strap 3M #2214 Small adjustable wrist strap 3M #3051 conductive ground cord
Anti Static Vacuum Cleaner	46–194427P278 46–194427P279	120V 230V
Air Filter		air intake
Safety Analyzer	46–285652G1	DALE 600 KIT (or equivalent) for electrical tests
SVHS VCR Cassette	E7010GG E7010GF	60 minute 120 minute
SVHS VCR Head Cleaner		See VCR user manual for requirements
3.5” MOD MEDIA	E8381AA E8381AB	blank 128 M disk (for 230MB MO drive) blank 230 M disk (for 230MB MO drive) blank 640 M disk (for 1.3GB MO drive) blank 1.3 GB disk (for 1.3GB MO drive)
3.5” MOD Media Cleaner	2117811	cleans the diskettes
3.5” MOD Head Cleaner Kit	2148392	cleans the drive heads
QIQ Phantom	E8370RB	RMI Grayscale Target Model 403GS
CD-R Media cleaner		cleans the diskettes
B/W Printer Cleaning Sheet		See printer user manual for requirements
Color Printer Cleaning Sheet		See printer user manual for requirements
Disposable Gloves		

Section 10-5
System Periodic Maintenance

10-5-1 Preliminary Checks

The preliminary checks take about 15 minutes to perform. Refer to the system user documentation whenever necessary.

Table 10-4 System Preliminary Checks

Step	Item	Description
1	Ask & Listen	Ask the customer if they have any problems or questions about the equipment.
2	Paperwork	Fill in the top of the Periodic Maintenance (PM) Inspection Certificate. Note all probes and system options.
3	Power up	Turn the system power on and verify that all fans and peripherals turn on. Watch the displays during power up to verify that no warning or error messages are displayed.
4	Probes	Verify that the system properly recognizes all probes.
5	Displays	Verify proper display on the monitor and touch panel.
6	Presets	Backup all customer presets on an CD-R.

10-5-2 Functional Checks (See Also Chapter 4)

The functional checks take about 60 minutes to perform. Refer to the system user documentation whenever necessary.

10-5-2-1 System Checks

Table 10-5 System Functional Checks

÷	Step	Description
	B-Mode	Verify basic B-Mode (2D) operation. Check the basic system controls that affect this mode of operation.
	CF-Mode	Verify basic CF-Mode (Color Flow Mode) operation. Check the basic system controls that affect this mode of operation.
	Doppler Modes	Verify basic Doppler operation (PW and CW if available). Check the basic system controls that affect this mode of operation.
	M-Mode	Verify basic M-Mode operation. Check the basic system controls that affect this mode of operation.
	*Applicable Software Options	Verify the basic operation of all optional modes such as Multi-Image, 3D, Contrast, Harmonics, Cine, Stress Echo,... etc. Check the basic system controls that affect each options operation.
	Probe Elements	Perform an Element Test on each probe to verify that all probe elements (and system channels) are functional.
	System Diagnostic	Perform the Automatic Tests to verify that all boards function according to specifications.
	Control Panel Test	Perform the Control Panel Test Procedure to verify that all keyboard controls are OK. This is performed by the internal PC (backend processor) which does a normal keyboard run through.
	Monitor	Verify basic Monitor display functions. Refer to Chapter 3 of the User Manual.
	Touch Panel	Verify basic Touch Panel display functions. Refer to Chapter 3 of the User Manual.
	Measurements	Scan a gray scale phantom and use the measurement controls to verify distance and area calculation accuracy. Refer to the User Manual, Chapter 18, for measurement accuracy specifications.

*NOTE: * Some software may be considered standard depending upon system model configuration.*

10-5-2-2 Peripheral/Option Checks

If any peripherals or options are not part of the system configuration, the check can be omitted. Refer to the User Manual for a list of approved peripherals/options.

Table 10-6 GE Approved Peripheral/Hardware Option Functional Checks

Step	Item	Description
1	VCR	Verify record/playback capabilities of the VCR. Clean heads and covers if necessary.
2	B/W Printer	Verify hardcopy output of the B/W video page printer. Clean heads and covers if necessary.
3	Color Printer	Verify hardcopy output of the Color video page printer. Clean heads and covers if necessary.
4	DICOM	Verify that DICOM is functioning properly. Send an image to a DICOM device.
5	InSite/iLinq	Verify that InSite is functioning properly. Ensure two-way remote communications. (Warranty & Contract Customers only)
6	Camera	Verify hardcopy output of the film camera. Clean as necessary.
7	Footswitch	Verify that the footswitch is functioning as programed. Clean as necessary.
8	ECG	Verify basic operation with customer
9	3D Probe	

10-5-3 Input Power

10-5-3-1 Mains Cable Inspection

Table 10-7 Mains Cable Inspection

Step	Item	Description
1	Unplug Cord	Disconnect the mains cable from the wall and system.
2	Inspect	Inspect it and its connectors for damage of any kinds.
3	Verify	Verify that the LINE, NEUTRAL and GROUND wires are properly attached to the terminals, and that no strands may cause a short circuit.
4	Verify	Inlet connector retainer is functional.

10-5-4 Cleaning

10-5-4-1 General Cleaning

Table 10-8 General Cleaning

Step	Item	Description
1	Console	Use a fluid detergent in warm water on a soft, damp cloth to carefully wipe the entire system. Be careful not to get the cloth too wet so that moisture does not enter the console.
2	Probe Holder	Clean probe holders. (they may need to be soaked to remove excess gel).
3	Monitor and Touch Panel	

10-5-4-2 Air Filter Cleaning

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Table 10-9 Air Filter Cleaning - frequency varies with your environment

Step	Item	Description
1	Remove Filter Cover	Refer to Chapter 8 for air filter location and removal instructions
2	Clean Filter	The filters can be cleaned in sprinkling water, or they can be dusted with a vacuum cleaner. If the filter is metal wash and/or vacuum. If the filter is fiber or plastic vacuum or replace
3	Install Filter	Install the clean filter.

NOTE: For your convenience or of the air filter is too dirty, replacement filters are available. Refer to Chapter 9 for the air filter replacement part number.

10-5-5 Physical Inspection

Table 10-10 Physical Checks

Step	Item	Description
1	Labeling	Verify that all system labeling is present and in readable condition. .
2	Scratches & Dents	Inspect the console for dents, scratches or cracks.
3	Control Panel	Inspect keyboard and control panel. Note any damaged or missing items.
4	Control Panel Movement	Verify ease of control panel (Operator I/O Panel) movement in all acceptable directions. Ensure that it latches in position as required.
5	Wheels & Brakes	Check all wheels and casters for wear and verify operation of foot brake, to stop the unit from moving, and release mechanism. Check all wheel locks and wheel swivel locks for proper operation.
6	Cables & Connectors	Check all internal cable harnesses and connectors for wear and secure connector seating. Pay special attention to footswitch assembly and probe strain or bend reliefs.
7	Shielding & Covers	Check to ensure that all EMI shielding, internal covers, air flow panels and screws are in place. Missing covers and hardware could cause EMI/RFI problems while scanning.
8	External I/O	Check all connectors for damage and verify that the labeling is good.
9	Op Panel Lights	Check for proper operation of all operator panel and TCG lights.
10	Monitor Light	Check for proper operation of any monitor lights and/or
11	External Microphone	Check for proper operation of any external microphones by recording an audio test.

10-5-6 Optional Diagnostic Checks

To complete the PM checks, access the diagnostic software as described in Chapters 5 or 7. View the error logs and run desired diagnostics.

10-5-6-1 View the Logs

1.) Review the system error log for any problems.

2.) Check the temperature log to see if there are any trends that could cause problems in the future.

10-5-7 Probe Maintenance

10-5-7-1 Probe Related Checks

Table 10-11 Probe Related Checks

Step	Item	Description
1	Probe Holder	Clean probe holders. (they may need to be soaked to remove excess gel).
2	Probes	Thoroughly check the system probe connectors and remove dust from inside the connector sockets if necessary. Visually check for bent, damaged or missing pins

10-5-7-2 Basic Probe Care

The system user manuals and various probe handling cards provide a complete description of probe care, maintenance, cleaning and disinfection. Ensure that you are completely familiar with the proper care of GE probes.

Ultrasound probes can be easily damaged by improper handling. See the User Manual and probe care cards for more details. Failure to follow these precautions can result in serious injury and equipment damage. Failure to properly handle or maintain a probe may also void its warranty.

Any evidence of wear indicates the probe cannot be used.

Do a visual check of the probe pins and system sockets before plugging in a probe.

TEE and Interoperative probes often have special considerations and individual probe user manuals. For TEE and Interoperative probes also refer to their separate user manuals.

10-5-7-3 Basic Probe Cleaning

Refer to the User's Manual for details on probe cleaning.

NOTE: To help protect yourself from blood borne diseases, wear approved disposable gloves. These are made of nitrile derived from vegetable starch to prevent allergic latex reactions.

NOTE: Failure to follow the prescribed cleaning or disinfection procedures will void the probe's warranty. DO NOT soak or wipe the lens with any product not listed in the User Manual. Doing so could result in irreparable damage to the probe. Follow care instructions that came with the probe.

NOTE: Disinfect a defective probe before you return it. Be sure to tag the probe as being disinfected.

Section 10-6
Using a Phantom

See the Basic User Manual "*Customer Maintenance*" for information on using a phantom and quality assurance tests.

Section 10-7
Electrical Safety Tests

10-7-1 Safety Test Overview

The electrical safety tests in this section are based on and conform to NFPA 99 (For USA) and IEC 60601-1 Medical Equipment Safety Standards. They are intended for the electrical safety evaluation of cord-connected, electrically operated, patient care equipment. If additional information is needed, refer to the NFPA 99 (For USA) and IEC 60601-1 documents.

WARNING ***THE USER MUST ENSURE THAT THE SAFETY INSPECTIONS ARE PERFORMED AT LEAST EVERY 12 MONTHS ACCORDING TO THE REQUIREMENTS OF THE PATIENT SAFETY STANDARD IEC-EN 60601-1. ONLY TRAINED PERSONS ARE ALLOWED TO PERFORM THE SAFETY INSPECTIONS MENTIONED ABOVE.***

CAUTION **To avoid electrical shock, the unit under test must not be connected to other electrical equipment. Remove all interconnecting cables and wires. The unit under test must not be contacted by users or patients while performing these tests.**

CAUTION **Possible risk of infection. Do not handle soiled or contaminated probes and other components that have been in patient contact. Follow appropriate cleaning and disinfecting procedures before handling the equipment.**

Test the system, peripherals and probes for leakage current. Excessive leakage current can cause injury or death in sensitive patients. High leakage current can also indicate degradation of insulation and a potential for electrical failure. Do not use probes or equipment having excessive leakage current.

To minimize the risk that a probe may shock someone the customer should:

- Not use a probe that is cracked or damaged in any way
- Check probe leakage current:
    * once a year on surface probes
    * twice a year on endocavitary probes
    * whenever probe damage is suspected

10-7-2 GEMS Leakage Current Limits

The following limits are summarized for NFPA 99 (For USA) and IEC 60601-1 Medical Equipment Safety Standards. These limits are GEMS standards and in some cases are lower than the above standards listed.

Table 10-12 Chassis Leakage Current Limits—Accessible Metal Surfaces

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral
USA	N/A	0.3 mA	0.3 mA	N/A
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA

Table 10-13 Type BF Applied Part Leakage Current Limits - Non-Conductive (Floating) Surface and Cavity Probes

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
USA	0.05 mA	0.05 mA	0.05 mA	0.05 mA	N/A
Other	0.1 mA	0.5 mA	0.5 mA	0.5 mA	5.0 mA

Table 10-14 Type CF Applied Part Leakage Current Limits - Surgical Probes and ECG Connections

Country	Normal Condition	Open Ground	Reverse Polarity	Open Neutral	*Mains Applied
USA	0.01 mA	0.05mA	0.05 mA	N/A	0.025 mA
Other	0.01 mA	0.05 mA	0.05 mA	0.05 mA	0.05 mA

*NOTE: *Mains Applied refers to the sink leakage test where mains (supply) voltage is applied to the part to determine the amount of current that will pass (or sink) to ground if a patient contacted mains voltage.*

The following tests are performed at the factory and should be performed at the site. These tests are: grounding continuity, chassis leakage current, probe leakage current, and ECG leakage current. All measurements are made with an electrical safety analyzer Model 600/600E built by Dale Technology Corporation or equivalent device.

10-7-3 Outlet Test - Wiring Arrangement - USA & Canada

Test all outlets in the area for proper grounding and wiring arrangement by plugging in the neon outlet tester and noting the combination of lights that are illuminated. Any problems found should be reported to the hospital immediately and the receptacle should not be used.

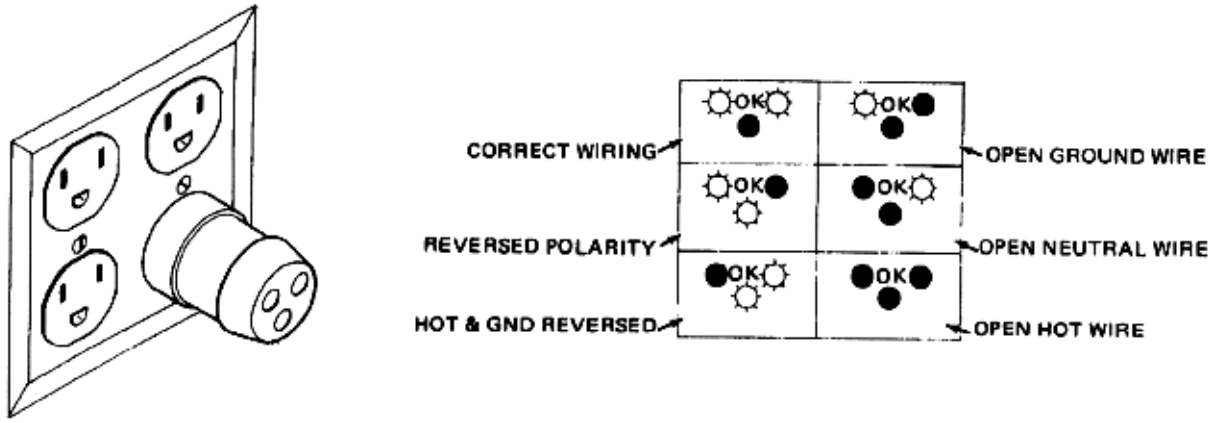

Figure 10-1 Typical Alternate Outlet Tester

The Dale 600 has self-contained lamps designed for testing the outlet wiring arrangement. Plug the Dale 600 into each outlet to be tested comparing the lamp status.

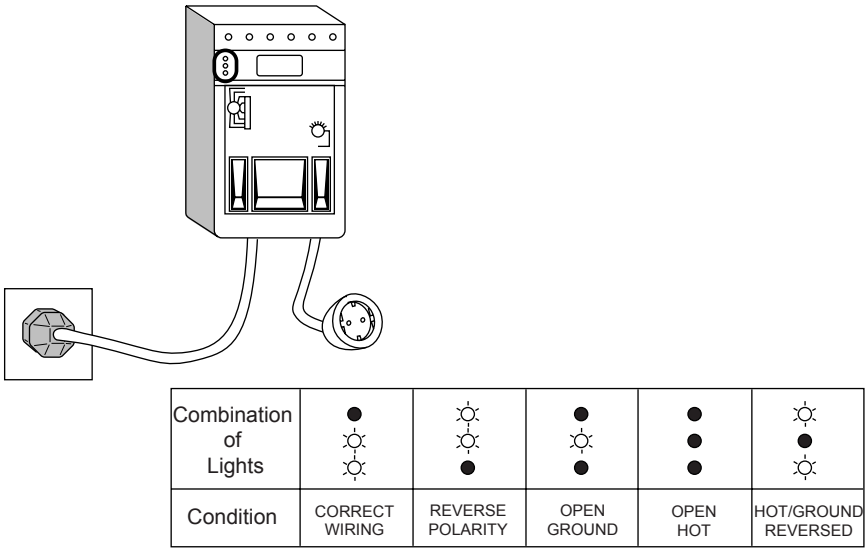

Figure 10-2 Dale 600 Outlet Test

NOTE: No outlet tester can detect the condition where the Neutral (grounded supply) conductor and the Grounding (protective earth) conductor are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

10-7-4 Grounding Continuity

CAUTION Electric Shock Hazard. The patient must not be contacted to the equipment during this test

Measure the resistance from the third pin of the attachment plug to the exposed metal parts of the case. The ground wire resistance should be less than **0.2** ohms. Reference the procedure in the IEC 601-1.1.

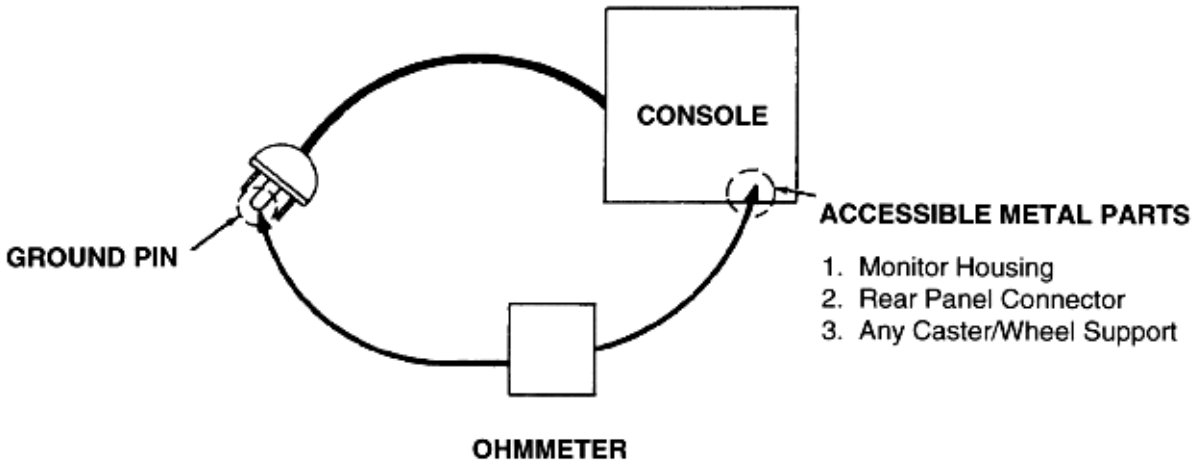

Figure 10-3 Ground Continuity Test

10-7-4-1 Meter Procedure

Follow these steps to test the ground wire resistance.

1.) Turn the LOGIQ™ 7 unit OFF.
2.) Plug the unit into the meter, and the meter into the tested AC wall outlet.
3.) Plug the black chassis cable into the meter's “CHASSIS” connector and attach the black chassis cable clamp to an exposed metal part of the LOGIQ™ 7 unit.
4.) Set the meter's “FUNCTION” switch to the RESISTANCE position.
5.) Set the meter's “POLARITY” switch to the OFF (center) position.
6.) Measure and record the ground wire resistance.

10-7-5 Chassis Leakage Current Test

10-7-5-1 Definition

This test measures the current that would flow in a grounded person who touched accessible metal parts of the bedside station if the ground wire should break. The test verifies the isolation of the power line from the chassis. The meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit On and Off, with the power line polarity Normal and Reversed. Record the highest reading.

⚠ **CAUTION Electric Shock Hazard. When the meter's ground switch is OPEN, don't touch the unit!**

⚠ **CAUTION Equipment damage possibility. Never switch the Polarity and the status of Neutral when the unit is powered ON. Be sure to turn the unit power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the unit may be damaged.**

10-7-5-2 Generic Procedure

The test verifies the isolation of the power line from the chassis. The testing meter is connected from accessible metal parts of the case to ground. Measurements should be made with the unit ON and OFF, with the power line polarity Normal and Reversed. Record the highest reading of current.

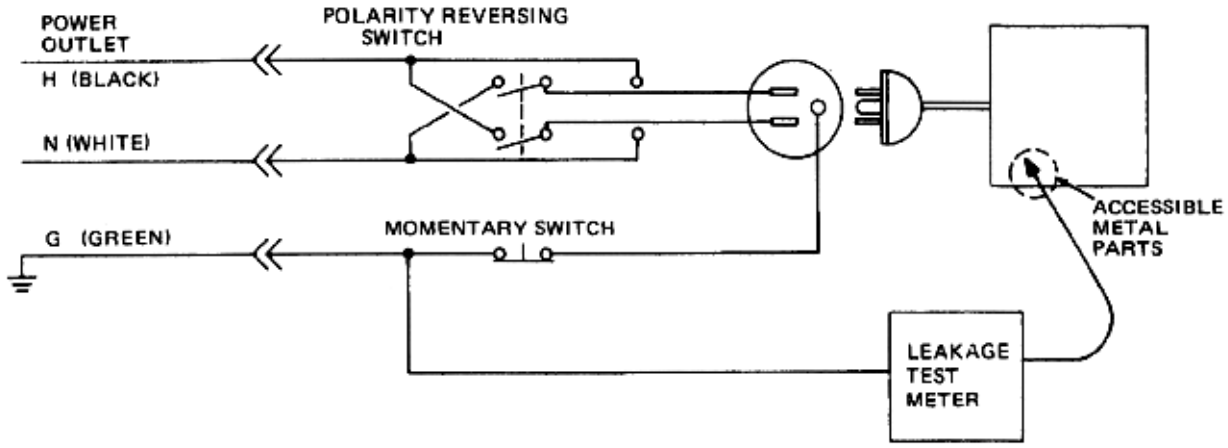

Figure 10-4 Set Up for Chassis Source Leakage Current, IEC 601-1 Clause 19 - Continuos Leakage Currents and Patient, Auxiliary Currents

When using the Microguard or a similar test instrument, its power plug may be inserted into the wall outlet and the equipment under test is plugged into the receptacle on the panel of the meter. This places the meter in the grounding conductor and the current flowing from the case to ground will be indicated in any of the current ranges. The maximum allowable limit for chassis source leakage is shown in Table 10-12.

10-7-5-3 Data Sheet for Chassis Source Leakage Current

The test passes when all readings measure less than the value shown in Table 10-12. Record all data on the PM Inspection Certificate.

Table 10-15 Typical Data Sheet for Chassis Source Leakage Current

Unit Power	Tester Polarity Switch	Tester Neutral or Ground Switch	Test 1 Probe Connector	Test 2 Wheel	Test 3 CRT	Optional Test 4	Optional Test 5
Enter Name of tested peripheral here:							
ON	NORM	OPEN					
ON	NORM	CLOSED					
ON	REV	OPEN					
ON	REV	CLOSED					
OFF	NORM	OPEN					
OFF	NORM	CLOSED					
OFF	REV	OPEN					
OFF	REV	CLOSED					

10-7-6 Isolated Patient Lead (Source) Leakage–Lead to Ground

10-7-6-1 Definition

This test measures the current which would flow to ground from any of the isolated ECG leads. The meter simulates a patient who is connected to the monitoring equipment and is grounded by touching some other grounded surface. Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the ultrasound console Off and On. For each combination the operating controls, such as the lead switch, should be operated to find the worst case condition.

CAUTION **Equipment damage possibility. Never switch the Polarity when the unit is powered ON. Be sure to turn the unit power OFF before switching the polarity using the POLARITY switch. Otherwise, the unit may be damaged.**

10-7-6-2 Generic Procedure

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the unit Off and On. For each combination, the operating controls such as the lead switch should be operated to find the worst case condition.

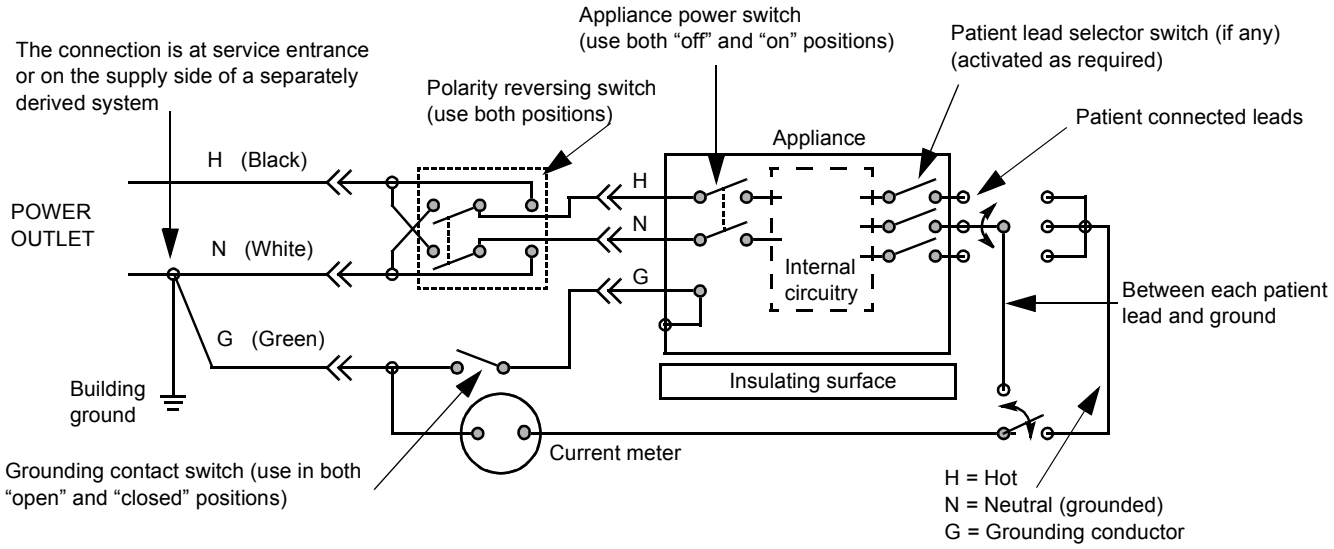

Figure 10-5 Test Circuit for Measuring Non-Isolated Patient Leads

10-7-7 Isolated Patient Lead (Source) Leakage–Lead to Lead

Reference the procedure in the IEC 60601-1. When using the Dale 600, switch the meter's function selector to the LEAD-LEAD position. Select and test each of the five ECG lead positions (except ALL) on the LEAD selector, testing each to the power condition combinations found in the table. Record the highest leakage current measured.

10-7-8 Isolated Patient Lead (Sink) Leakage-Isolation Test

Reference the procedure in the IEC 60601-1. When using the Dale 600, switch the meter's function selector to the LEAD-ISO. Select the ALL position on the lead selector. Depress the rocker switch to ISO TEST to test lead isolation.

⚠ **CAUTION** **Line voltage is applied to the ECG leads during this test. To avoid possible electric shock hazard, the system being tested must not be touched by patients, users or anyone while the ISO TEST switch is depressed.**

NOTE: It is not necessary to test each lead individually or power condition combinations as required in previous tests.

10-7-8-1 Data Sheet for ECG Leakage Current

The test passes when all readings measure less than the value shown in the table below. Record all data on the PM Inspection Certificate.

Table 10-16 Maximum Allowance Limit for ECG Leakage Current

	AC Power Source	Maximum Allowance Limit	
		GROUND OPEN	GROUND CLOSED
Patient Lead to Ground Leakage Current Test and Patient Lead to Lead Leakage Current Test	115V	10uA	10uA
	220/240V	500uA	10uA

Table 10-17 Maximum Allowance Limit for ECG Leakage Current

	AC Power Source	Maximum Allowance Limit
Patient Lead Isolation Current Test	115V	20uA
	220/240V	5mA

Table 10-18 Typical Data Sheet for ECG Leakage Current

ECG Power	Tester Polarity Switch	Tester Ground Switch	Tester Lead Selector				
			RL	RA	LA	LL	C
ON	NORM	CLOSED					
ON	REVERSE	CLOSED					
ON	NORM	OPEN					
ON	REVERSE	OPEN					
OFF	NORM	CLOSED					
OFF	REVERSE	CLOSED					
OFF	NORM	OPEN					
OFF	REVERSE	OPEN					

10-7-9 Probe Leakage Current Test

10-7-9-1 Definition

This test measures the current that would flow to ground from any of the probes through a patient who is being scanned and becomes grounded by touching some other grounded surface.

10-7-9-2 Generic Procedure

Measurements should be made with the ground open and closed, with power line polarity normal and reversed, and with the unit Off and On. For each combination, the probe must be active to find the worst case condition.

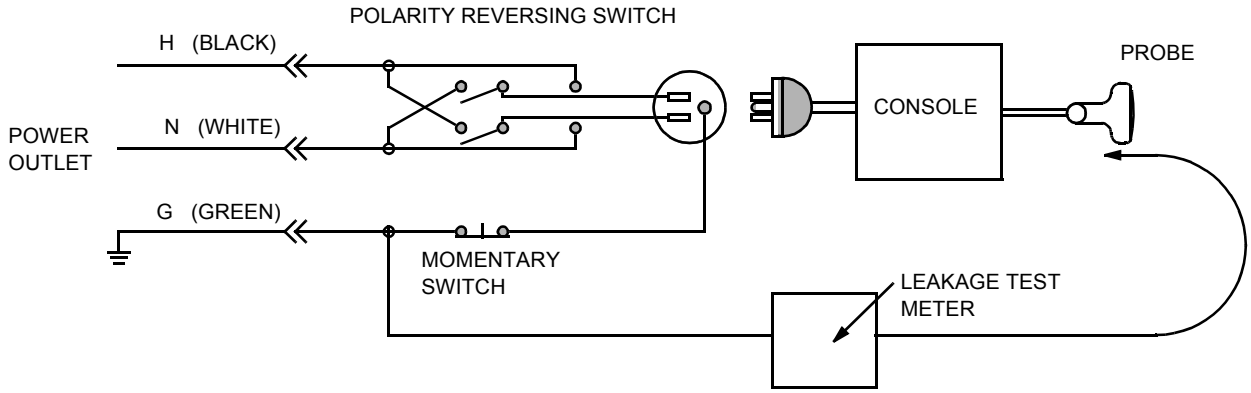

Figure 10-6 Set Up for Probe Leakage Current

NOTE: Each probe will have some amount of leakage current, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement.

10-7-9-3 No Meter Probe Adapter Procedure

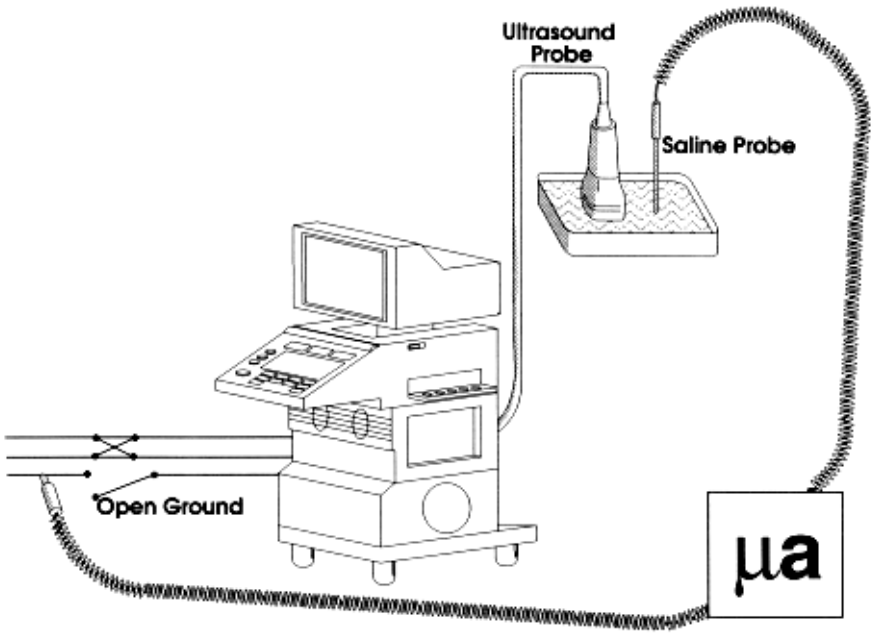

Figure 10-7 No Meter Probe Adapter Procedure

Follow these steps to test each transducer for leakage current.

1.) Turn the LOGIQ™ 7 unit OFF.
2.) Plug the unit into the test meter, and the meter into the tested AC wall outlet.
3.) Plug the external probe into the meter's (Dale 600) “EXTERNAL” connector.
4.) Set the meter's “FUNCTION” switch to EXTERNAL position.
5.) Connect the probe for test with the connector of the console.
6.) Add the saline probe and the imaging area of the probe into the saline bath.
7.) Have unit power ON for the first part; turn it OFF for the second half.
8.) Depress the ISO TEST rocker switch and record the highest current reading.
9.) Follow the test conditions described in Table 10-19 for every transducer.
10.)Keep a record of the results with other hand copies of PM data.

10-7-9-4 Data Sheet for Transducer Source Leakage Current

The test passes when all readings measure less than the values shown in Table 10-13 and Table 10-14. Record all data on the PM Inspection Certificate.

CAUTION **Equipment damage possibility. Never switch the Polarity and the status of Neutral when the unit is powered ON. Be sure to turn the unit power OFF before switching them using the POLARITY switch and/or the NEUTRAL switch. Otherwise, the unit may be damaged**

Table 10-19 Typical Data Sheet For Transducer Source Leakage Current

Transducer Tested:			
Unit Power	**Tester Power Polarity Switch**	**Tester GROUND or NUETRAL Switch**	**Measurement**
ON	NORM	OPEN	
ON	NORM	CLOSED	
ON	REV	OPEN	
ON	REV	CLOSED	
OFF	NORM	OPEN	
OFF	NORM	CLOSED	
OFF	REV	OPEN	
OFF	REV	CLOSED	

Section 10-8
When There's Too Much Leakage Current...

CHASSIS FAILS

Check the ground on the power cord and plug for continuity. Ensure the ground is not broken, frayed, or intermittent. Replace any defective part.

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

Test the wall outlet; verify it is grounded and is free of other wiring abnormalities. Notify the user or owner to correct any deviations. As a work around, check the other outlets to see if they could be used instead.

NOTE: No outlet tester can detect the condition where the white neutral wire and the green grounding wire are reversed. If later tests indicate high leakage currents, this should be suspected as a possible cause and the outlet wiring should be visually inspected.

PROBE FAILS

Test the probe in another connector to isolate if the fault lies with the probe or the scanner.

NOTE: Each probe will have some amount of leakage, dependent on its design. Small variations in probe leakage currents are normal from probe to probe. Other variations will result from differences in line voltage and test lead placement. The maximum allowable leakage current for body surface contact probe differs from inter-cavity probe. Be sure to enter the correct probe type in the appropriate space on the check list.

If excessive leakage current is slot dependent, inspect the system connector for bent pins, poor connections, and ground continuity.

If the problem remains with the probe, replace the probe.

PERIPHERAL FAILS

Tighten all grounds. Ensure star washers are under all ground studs.

Inspect wiring for bad crimps, poor connections, or damage.

STILL FAILS

If all else fails, begin isolation by removing the probes, external peripherals, then the on board ones, one at a time while monitoring the leakage current measurement.

NEW UNIT

If the leakage current measurement tests fail on a new unit and if situation can not be corrected, submit a Safety Failure Report to document the system problem. Remove unit from operation.

ECG FAILS

Inspect cables for damage or poor connections

PM INSPECTION CERTIFICATE

Customer Name:		System ID:	Dispatch Number / Date Performed:	Warranty/Contract/HBS
System Type		Model Number:	Serial Number:	Manufacture Date:
Probe 1:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 2:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 3:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 4:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 5:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 6:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 7:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 8:	Frequency:	Scan Format*:	Model Number:	Serial Number:
Probe 9:	Frequency:	Scan Format*:	Model Number:	Serial Number:

* Scan Format: Phased Array, Linear Array, Curved Array, Mechanical Array or Other

FUNCTIONAL CHECKS

Functional Check (if applicable)	OK? or N/A
B-Mode Function	
Doppler Modes Function	
CF-Mode Function	
M-Mode Function	
Applicable Software Options	
Applicable Hardware Options	
Control Panel	
Monitor	
Touch Panel	
Measurement Accuracy	
GE Approved Peripherals	

PHYSICAL INSPECTION AND CLEANING

Physical Inspection and Cleaning (if applicable)	Inspect	Clean
Console		
Monitor		
Touch Panel		
Air Filter		
Probe Holders		
External I/O		
Wheels, Brakes & Swivel Locks		
Cables and Connectors		
GE Approved Peripherals (VCR, CD-R, MOD, Printers)		

COMMENTS:

ELECTRICAL SAFETY

Electrical Test Performed	Max Value Allowed	Value Measured	OK?	Comments
Outlet (correct ground &wiring config.)				
System Ground Continuity				
Chassis Source Leakage Current - Probe				
Chassis Source Leakage Current - Wheel				
Chassis Source Leakage Current - CRT				
Patient Lead Source Leakage (Lead to Ground)				
Patient Lead Source Leakage (Lead to Lead)				
Patient Lead Source Leakage (Isolation)				
Peripheral 1 Leakage Current				
Peripheral 1Ground Continuity				
Peripheral 2 Leakage Current				
Peripheral 2Ground Continuity				
Peripheral 3 Leakage Current				
Peripheral 3Ground Continuity				

PROBES

Probe Number (from previous page)	Max Value Allowed	Max Value Measured	OK?	Comments
Probe 1:				
Probe 2:				
Probe 3:				
Probe 4:				
Probe 5:				
Probe 6:				
Probe 7:				
Probe 8:				
Probe 9:				

Final Check. All system covers are in place. System scans with all probes as expected.

Accepted by: _____

GE MEDICAL SYSTEMS

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